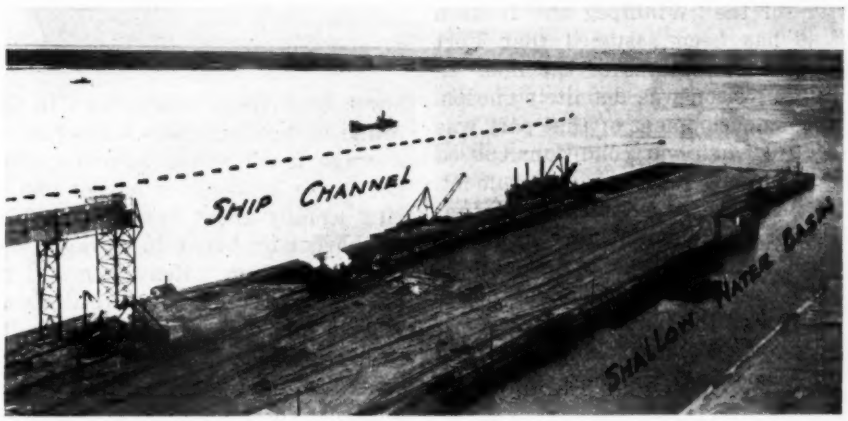
THE EXCAVATING ENGINEER
FOUNDED 1905

OCTOBER 1932
VOL. XXVI NO. 10

Development Work at CHURCHILL HARBOR



From the top of the newly constructed elevator we see the dipper dredge working on the channel along the face of the dock. The width of the ship channel is indicated by dotted line.

By Harry D. Brown

One and one half million cubic yards of material are excavated by two Bucyrus-Erie 6-8 cubic yard dipper dredges to provide Canada's far north seaport with tug basing, approach channel, crib seats and winter berths.

THE SUCCESSFUL voyage of the *S. S. Farnworth,* carrying the initial test shipment of grain from Churchill to the port of London, England, in the fall of 1931, demonstrated the practicability of Canada's newest seaport as an outlet for the produce of the west. Navigation of Hudson Straits proved no more difficult, in the opinions of the captains of both the *Farnworth* and her sister ship the *Warkworth,* than that of any other of the better known shipping routes of the world. But the captains strongly advised the use of the gyro compass for safe navigations in the Bay. With the Bay route to Europe cutting from 1000 to 1500 miles off the total haul, it is to be expected that the northern seaway will be used to advantage by the producers of western Canada and the northwestern States of the Union.

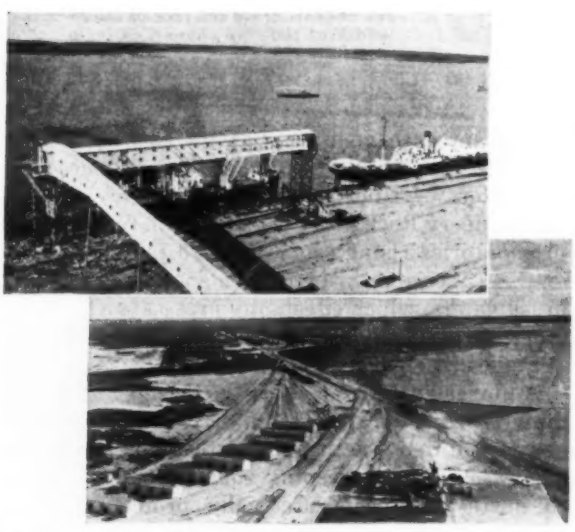
Churchill Harbor, known to seafaring men since the seventeenth century, has its location at the mouth of the Churchill River, at its confluence with the waters of Hudson Bay. The entrance lies between Merry Rock and Fort Prince of Wales, rocky promontories rising from 40 to 70 feet above sea-level. In these, nature has furnished indestructible breakwaters, which effectually protect the entrance from storms, and enclose a natural harbor some six miles in length.

A glance at the map on the next page will immediately show why Churchill has been classed as one of the finest natural roadsteads of the world. The west shore, sweeping round from due north to north-north-east, effectually protects the anchorage from any storms coming from west of north-north-east, while the east shore, running north-west to within 1600 feet of Fort Prince of Wales, admits no storms from south of east-north-east. Also, any storms which may come from between north-north-east and east-north-east must, by reason of the configuration of the land, spend their force on the north part of the west shore. On the eastern side of the harbor calm waters are found at all times, affording a safe and sheltered haven for shipping entering the roadstead.

Note: The small illustration at the lower right and the wide illustration below on the opposite page have been made available to Excavating Engineer readers through the courtesy of Coan's Photo Studio, The Pas, Manitoba, Canada. We are likewise indebted to Coan's Photo Studio for the lower illustration on page 485.

Churchill occupies a strategic position as a grain port which has only been conceded after a fifty years' struggle for recognition. Even yet the route has its opponents, and that in face of the successful 1931 shipment of a half million bushels of wheat, and the some two and one-quarter million bushels now being delivered to the northern port. The history of the fight for the Hudson Bay Railway and its terminal port on Hudson Bay, occupies no place, however, in an article of this kind. Suffice to say that it has been the greatest bone of contention in Western Canada for the past half century.

From the year 1881, when Hugh Sutherland secured the charter for the "Winnipeg and Hudson Bay Railway," it has been assumed that Fort Churchill would be the terminus of the line. In 1912, however, Port Nelson was definitely chosen. Work on the harbor development of that port was carried on until 1918 when war conditions caused a temporary cessation. In 1927, the Government, not satisfied with the choice of Nelson as the terminal, engaged Frederick Palmer (now Sir Frederick) an eminent British engineer, to make an examination of both harbors and investigate their several possibilities. For the purposes of comparison, an "initial test development" scheme, calling for three working berths at the dock side, with three stem and stern moorings in the stream, all for vessels of 28 feet draft, was used as the basis



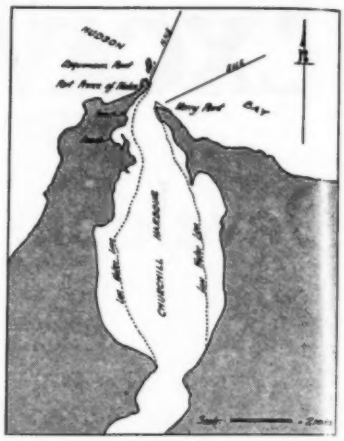
Above: The S. S. Farnworth loading grain, with S. S. Warkworth standing by. Below: looking south towards the townsite from the elevator showing much of the construction work done to make Churchill Harbor one of Canada's important seaports.

of the estimates. Mr. Palmer's report strongly recommended the devolpment of Churchill harbor in preference to Nelson.

Climatic Conditions

Churchill is not, as popular fancy in the past would have us believe, a land of perpetual frost. True, winter temperatures drop some ten degrees

This sketch shows clearly Nature's fine protection from storm afforded shipping in Churchill Harbor.



lower than those experienced in the mid-western prairies, but summer temperatures are, on an average much similar. Spring comes late in the north, the break-up of harbor and river ice occurring usually about June 15th. This present year, the harbor ice began to move out on June 8th—an early "break-up." Heavy ice still remains off the harbor mouth, however, until about July 20th to August 6th, between which dates it might be said the open season for navigation at Churchill begins. The open season lasts somewhat over three months — until November 15th — when the harbor will again be covered with ice and shipping tied up.

Despite the fact that the ships of the Hudson Bay Company have been operating into the Bay for the past two centuries, no really reliable data is available on the actual opening and closing dates for shipping. The length of the season is, however, dependent on ice conditions in Hudson Straits, that narrow passage which connects Hudson Bay with the North Atlantic, and in Hudson Bay itself. The waters of the Straits never freeze over, but its entrances become blocked with the flows that drift in through the action of wind and tide. At the eastern end of this 500 mile passage, the ice barrier is formed by drifts from the huge Arctic pack moving down the North Atlantic, along the coast of Labrador. At the western end, the ice formed in the Bay itself, and that which comes down from the Arctic Ocean through Fox Channel, blocks the entrance for certain periods of the year. Ice formed in the bay itself may effectively block access to the western shore of the bay until August 10. The general consensus of opinion, however, is that for at least three and a half months the Straits are free of ice, but the flow of ice down the Churchill River itself may block navigation anywhere after October 18th.

The proposed program of development consisted of the construction of a wharf to accommodate three vessels; the dredging of a dock basin, approach channel, crib seats and winter berths, amounting in excavation to one and one-half million cubic yards of material; the erection of beacon

towers, buoys and navigation lights; the installation of the necessary dock equipment; the construction of slipways; and the erection of a 2,500,000 bushel grain elevator, with power house, workhouse, track sheds, etc. The necessary time to complete the works was estimated at three years. This "initial development" would give a limiting draft of ships of 28 feet.

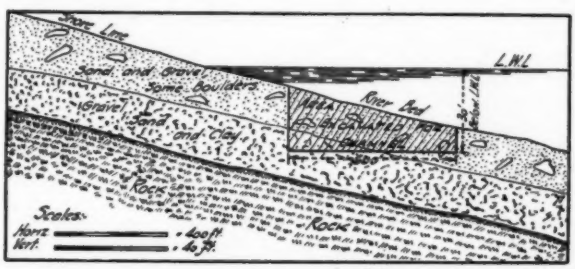
It will be seen from the contour map on the next page, that there is ample depth of water

Across blocks of river ice stranded at low tide we see the Bucyrus-Erie dipper dredges getting ready for their summer's work.

at the entrance. The maximum depth is between 80 and 90 feet, with a channel, 850 feet wide, of depths over 30 feet at low tide. Within the entrance, a body of water 30 feet deep is found to extend along the western side of the harbor for a distance of approximately one mile. On the east, towards the dock site, the water rapidly shallows, decreasing to about six feet in depth at a point two and a half miles from the headlands. To accommodate vessels of 28 feet draft, as called for in the proposals, it was therefore necessary to dredge a channel, 600 feet wide, 30 feet in depth, from the docks, to connect with the natural 30 feet contour within the harbor entrance.

During the spring and summer of 1927, borings were taken over the area to be excavated. A total of twenty-two bore-holes were sunk, using a Dick's Well Drill and a Wash Boring Outfit. Four test pits were also sunk on the shore to confirm the findings of the bore holes. Below is a half section of the river bed at the proposed docks and channel. It will be seen from the sketch that the dredging for the ship channel is almost entirely in sand and gravel, with some clay and boulders. The rock, which appears on the surface in the form of cliffs, rising some fifty feet and more above the level of the sea, shelves deeply under the river bed, its depth increasing as it leaves the shore.

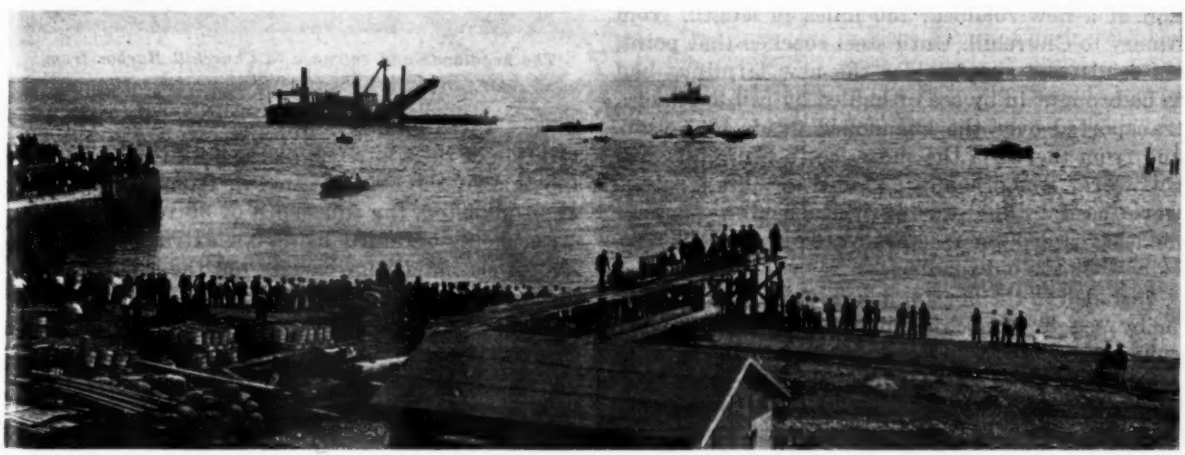
Referring to conditions in 1927, we find that at Port Nelson a considerable amount of material and equipment was lying idle,—staff buildings, warehouses, workshops, floating plant, including lighters, tug and timber deck scows. Churchill was still completely isolated—still dependent on the yearly visit of the Hudson Bay Company's boat for supplies — a lonely outpost with few residents — the



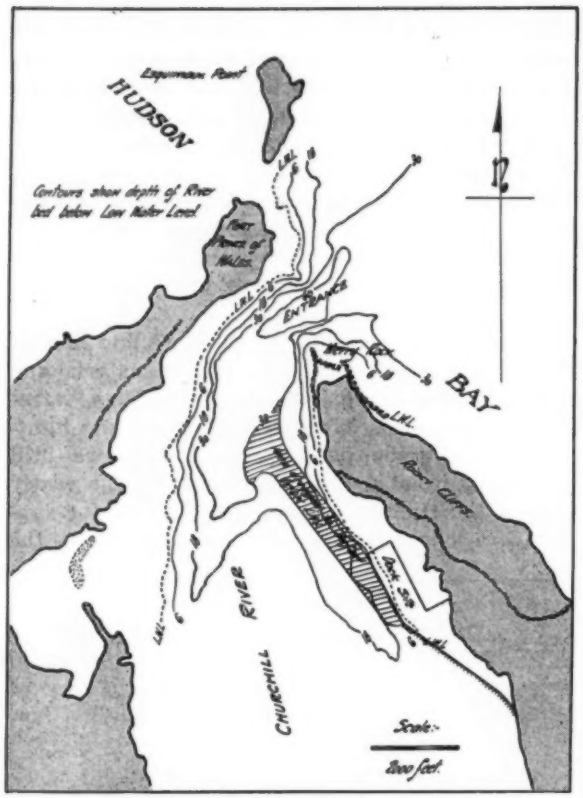
A cross-section of the river bed, east side. The area excavated for ship channel is clearly shown.

officers of the Royal Canadian Mounted—the Hudson Bay factor — the missionaries — one or two trappers. Certainly not equipped to even make a start on the three year constructed programme that was mooted. Port Nelson presented the only logical working base from which equipment and supplies could be transferred to the new port.

It is necessary at this point, to mention something of the actual railway construction. Steel had



One of the Bucyrus-Erie dipper dredges pauses work in mid-stream long enough to welcome America's premier airman, Chas. A. Lindbergh, who paid a visit to Churchill in August, 1931. Churchill's welcoming "committee" gathered at the water's edge. Lindbergh's plane may be seen resting on the waters of Churchill Harbor in the center just below the tug.



Churchill Harbor showing channel and dock site. The area dredged to 30 feet below low water level is clearly indicated.

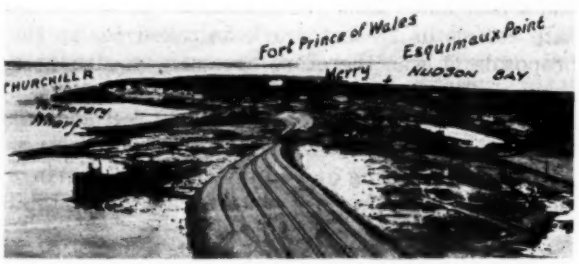
only reached Kettle Rapids, a point 332 miles north of The Pas, when war conditions caused the Government to temporarily abandon the project. The grade or embankment had, however, been completed through to Port Nelson—a distance of 424 miles from the southern terminus. Rehabilitation work was commenced in the spring of 1926. By the end of the following year, steel had been laid to Amery, 78 miles from Port Nelson. The decision to proceed to Churchill meant the abandonment of this last portion of the grade, and the construction of a new roadbed, 150 miles in length, from Amery to Churchill. Until steel reached that point, materials and supplies for the new terminus had to be brought in by sea or hauled by rail to Amery, transported over the abandoned grade to Nelson, and from there via the shore ice to Churchill. For this work, "sleigh trains," hauled by Linn tractors, were used, while during the ensuing summer months, caterpillar tractors were operated successfully over the old roadbed.

Included in the floating plant which was brought in by sea to Churchill during 1928, were two 8 cubic-yard, Bucyrus-Erie dipper dredges, with hulls constructed by Canadian Vickers Limited, at Montreal. The dredges were erected at Montreal and towed into the Bay by Government tugs. A hopper barge, built by Collingwood Shipyards Limited, was also transported into Churchill, while lighters and scows were transferred from Nelson, and some 15,000 tons of material were brought in by boat from Halifax and Vancouver. In addition to the setting-up of equipment, a temporary wharf, over 1,000 feet in length and located three-quarters of a mile north of the permanent dock site was constructed in 1928. Winter quarters for the dredges, barges, hoppers etc., were also prepared.

Steel entered Churchill on March 29, 1929, permitting the early transportation of men and materials to the northern port. Work on the dock and harbor development, although confined mostly to the preparation of seats for dock cribs, went ahead rapidly during the season. Dredging operations were limited to the excavation of material along the westerly face of the proposed dock, where 470,000 cubic yards of material was removed over an area of 2,000 feet long by 600 feet wide.

The presence of ice in Churchill harbor until the end of June 1930, prevented an early start on the works. During the open season, however, 50% of the total final length of the westerly face of the dock was completed. The deep water cribs, each 150 feet in length, are constructed of 12-inch by 12-inch British Columbia fir, creosoted above L. W. L. Thirty-eight courses are built up in successive stages, moving as necessary to deeper water, before the cribs are placed in position at the dock face. There they are completed to their full height of fifty-five feet and filled.

The dredging season of 1930 commenced during the last week of June and continued until the middle of October, with the following equipment in use: two 8 cubic-yard dipper dredges, two hopper



The headlands and entrance to Churchill Harbor from the elevator.

barges, three dump scows, and two tugs. The excavation at the south end of the dock for crib seats, and that of the ship channel in front of the dock, was completed, the full depth of 30 feet below low water being attained using an extra long dipper arm. A second dredge carried out the excavation of the midstream channel, the total material excavated by both dredges for the season being 480,000 cubic yards. A small percentage of this was used as filling at the dock, and the remainder dumped in the Bay as waste. The excavated material was moved by the hopper barges, or on scows towed by tugs, and dumped about three-quarters of a mile offshore, in the waters south of Merry Point. Some difficulty was experienced in unloading during

(Continued on page 485)

Putting through the Fort Worth & Denver Northern, Childress to Pampa, Texas

Near Shamrock, Texas, Kadane Construction Company's 32-B handled 100,000 cubic yards of gypsum rock —mighty tough digging, all of it.

Hamilton & Gleason Company and Roberts Brothers, General Contractors, assisted by other well known grading contractors, rush 120-mile railroad extension through Texas Panhandle in record time. Work under the general contract started September, 1931; first train-run, July 15, 1932.

DURING the past five years the previously undeveloped Texas Panhandle, which means the twenty-six or more counties which extend in a narrow strip toward the Colorado and Kansas line in between New Mexico and Oklahoma, has been the seat of a great deal of activity in oil, gas and wheat. If you have noticed the business conditions map in *Nations Business* you will recall that Amarillo, the hub of the Texas Panhandle, has been consistently in white as one of the few bright spots of the country.

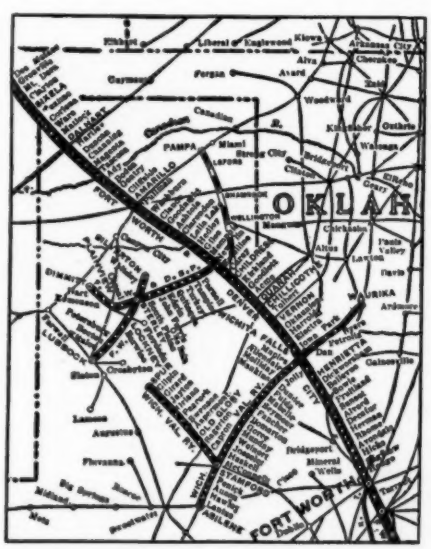
Radiating from Amarillo the Santa Fe, the Rock Island, and the Fort Worth & Denver, have built hundreds of miles of new railroad to reach out into the Panhandle. Along about the time it was discovered that the Panhandle is probably the biggest gas field in the world, it was also discovered that by using modern mechanical methods in farming the thousands of acres in this section that there was an attractive profit, even at present low prices, in raising wheat in the Panhandle.

In order to get in on this business all the railroads have been working feverishly to get the most important towns. In addition to the railroads mentioned above the Texas and Pacific are now trying to get approval on a new line from Big Springs through Lubbock into Amarillo.

The Fort Worth and Denver new construction, to be known as the Fort Worth and Denver Northern R. R., with which this article deals, runs due north from Childress in Childress County through Wellington in Collingsworth County to Shamrock in Wheeler County. From Shamrock the road runs almost northwest through Magic City and LeFors into Pampa.

At present the Rock Island crosses the new territory of the new Denver construction due east and west, and will intersect the Denver at Shamrock. The only other railroad now into this territory is a branch line of the M. K. and T. from Hollis, Oklahoma which dead ends at Wellington.

Considerable herds of cattle are still raised in the territory to be covered by this new line. There is also lots of wheat raised, and in Wheeler and Gray Counties there has been and will be continued activity by the oil companies who have found quite a gas field in that section.



The broken black line in the center of the map indicates the 120 mile section of the Fort Worth and Denver recently completed.

The Fort Worth and Denver is a subsidiary of the Burlington system, with headquarters in Fort Worth. Childress is the most important division point on the Fort Worth and Denver in Texas.

Contract Involves 4,500,000 Yards of Excavation

The 120 miles of new construction was let to Hamilton & Gleason and Roberts Brothers, working under a co-partnership as general contractors, except for the first ten miles which was under separate contract to Oran Speer. The general contract included grading, bridges and culverts and

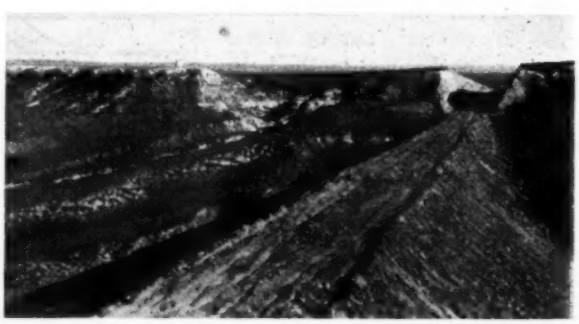
Here is another view of Kadane Construction Company's Bucyrus-Erie 32-B shovel in the tough gypsum rock in Shamrock. Note the level floor behind the 32-B.

ballast. In order to push the work through in the fastest possible time various sections were subbed, the resulting divisions being as follows:

Oran Speer Alvord, Texas. (Original, direct contract with F. W. & D.)	222-232	10 miles
START OF HAMILTON & GLEASON AND ROBERTS BROS. CONTRACT		
Barker Bros. Fort Worth, Tex.	232-240	8 miles
Green & Brown Rogers, Ark.	240-247	7 miles
G. A. Allen Denver, Colo.	247-251	4 miles
Green & Brown Rogers, Ark.	251-253	2 miles including passing tracks and yards
G. A. Allen Denver, Colo.	253-254	1 mile
Roy Skousen Albuquerque, N. M.	254-262½	8½ miles
Hamilton & Gleason Denver, Colo.	264-285	21 miles
Kadane Constr. Co. Frederick, Okla.		Special Cut in city of Shamrock
C. M. Green Rogers, Ark.	285-289	4 miles
Kadane Constr. Co. Frederick, Okla.	289-304	15 miles
Oran Speer Alvord, Tex.	304-313	9 miles
Roberts Bros. Chicago, Ill.	323-327	14 miles
John S. McKnight Amarillo, Tex. Peppard & Fulton Minneapolis, Minn.	327-331	4 miles including yards Bridges

Oran Speer Moves 863,000 Yards

Oran Speer had 536,060 cubic yards in his 10-mile section between miles 222 and 232 to the Prairie Dog Fork of the Red River and 327,025 cubic yards in his 9 miles between 304 and 313. His contract also included bridges on the 222 to 232 section and laying galvanized pipe on line from Childress to Pampa. This first section was let on a separate contract before the general contract was placed in order to expedite the construction. He started the first section in December, 1930 and finished about December 20, 1931. The second section was started January 8th, 1932 and finished May 8th, 1932. Mr. Speer used a P&H Model 700 and a Lima 101 with elevating grader and other smaller equipment and teams. He had three Caterpillar 60's on the job and worked from twenty to twenty-five Ford dump trucks. Foreman J. H. White was in charge of his grading work and Foreman E. M. Bailey handled the pipe laying gang. On the grading his maximum cut was fifty feet in depth and the average ran about thirty feet. The first section was worked from camp at mile 223 and the second from a camp at 308.



Here's a sample of the peculiar topography on Roberts Bros. section. This same formation was repeated over and over for considerable distances with variation only in size.

Barker Bros. Enthusiastic Over Their New Bucyrus-Erie 37-B

Barker Bros. had approximately 151,000 yards of solid rock, 132,000 cubic yards of loose rock and 39,000 yards of dirt on their 8 miles from 232 to 240, the heaviest section on the line. The work was

handled with: a new Bucyrus-Erie 37-B loading to International 3½-ton trucks, a Lorain 75-B also loading to 3½ ton Internationals, and a Lima "101" loading to Ford 2-ton trucks. Tom Barker, a son of Charles Barker operated the new Bucyrus-Erie and was certainly enthusiastic about the ease with which it handled. After loading out 7,000 yards of rock in 4½ 10-hour shifts he remarked, "I just wish they had enough trucks to keep me going." Barker Brothers work was started September 15th, 1931 and completed March 15th, 1932. Superintendent Jno. W. Lane, was in charge of the operations with camps located fourteen miles from Childress then 21 miles from Childress.

Unusual Blasting Problem Encountered

Barker Brothers, to the surprise of all concerned encountered some unusual gypsum rock formations on this section which were extremely hard to shoot efficiently and, therefore, very difficult to handle. Although the surface appeared uniform the peculiar formations with varying seams of dirt made it impossible to drill a load any ten holes alike. Surface rock showing sometimes developed into only a crush and at other places a few feet away big gypsum boulders 25-feet in diameter were encountered. Black powder, straight dynamite, and various combinations of both were tried without entirely satisfactory results. Finally a method was arrived at which employed the new free-flowing du Pont dynamite powder and this worked out quite satisfactorily.

Hamilton & Gleason used a Bucyrus-Erie 50-B steamer on their section.

Green & Brown Move 275,787 Yards

Green & Brown moved 252,987 yards of earth, loose and solid rock on their 7-mile section between 240 and 247. The maximum cut here was 18 feet with the average at 8 feet. Work was started on this section September 10, 1931 and finished March 1st, 1932. Excavating was handled with a Lorain 75, 6 Model A Ford, 2 3-ton Reos and 1 International trucks, 3 Caterpillar Sixty's with 8-yard LaPlant-Choate wagons, and five fresnos. B. G. Brown was in charge and camp was located 7 miles south of Wellington.

Their section from 251 to 253 included passing track and yards located at Wellington. Here there was 22,800 yards of earth in two miles. It was

Team gang on Mile 286

light grading with an average cut of about 1½ feet, maximum 4 feet. This section was completed in exactly one month being started March 1st, 1932 and completed April 1st. The Lorain and fleet of trucks were used with the fresnos on the lighter grading. B. G. Brown was in charge and crew was quartered at Wellington.

G. A. Allen—85,000 Yards

G. A. Allen on the next four miles (247 to 251) had 65,000 yards which was handled by teams. This section was started Sept. 1st and completed Dec. 1st. Mr. Allen also completed another mile between 253 and 254 with his teams starting Dec. 1st and finishing Jan. 1st. Here he had 20,000 cubic yards.

Roy Skousen Moves 205,000 Yards

Roy Skousen on 8½ miles from 254 to 262½ and ending at the Salt Fork of the Red River had

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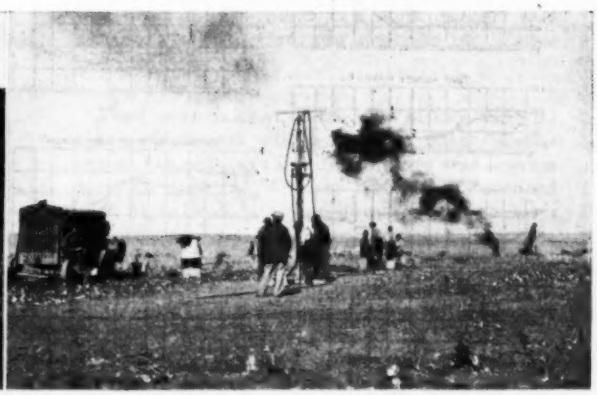

On Hamilton & Gleason Company section. Left: The Salt Fork Fill where 130,000 yards were spilled to carry the grade across. Right: Drilling operations with the 50-B loading to trucks in the background.

THE EXCAVATING ENGINEER
FOUNDED 1906

A Monthly Publication Devoted to Excavating and Allied Subjects

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THE EXCAVATING ENGINEER PUBLISHING CO.
F. O. Wyse, Managing Editor—Arnold Andrews, Editor
E. M. Houston, Advertising Manager.
South Milwaukee, Wisconsin
Printed in U. S. A.

The Business Situation

A STUDY of previous depressions shows that recovery is usually heralded first, by a rise of stock prices, and shortly afterwards by a rise in bond prices. Business activities react several months afterwards. In the past two months we have seen a remarkably sharp rise in the stock market, a rise which has more than doubled the total value of the securities listed. Bond prices, almost simultaneously, have also risen very satisfactorily. On all sides of us we see optimism gradually taking the place of the pessimistic dispair which filled the minds of so many business men three or four months ago. In the past three years we have experienced both, a depression of industrial and business activity, and a financial panic.

We have now experienced a financial recovery. The nations of the world have watched the markets of the United States as one of the best indicators of world conditions. They have seen huge amounts of gold withdrawn from our country without any serious effect on our financial stability. They have seen foreign holders of American securities dump these securities into our markets, impelled by fear that the country would not be able to maintain the gold standard for its currency. And in the last two months they have seen the direction of the flow of gold change until it is returning to this country in substantial amounts. Foreign investors are again purchasing American securities.

This financial recovery does not mean that we are embarking upon a period of immediate prosperity. The purchasing power of the people has been reduced to a point where the increase in activity must be gradual. However, we have now gained confidence—confidence merited by economic facts and we can expect a steady improvement in business.

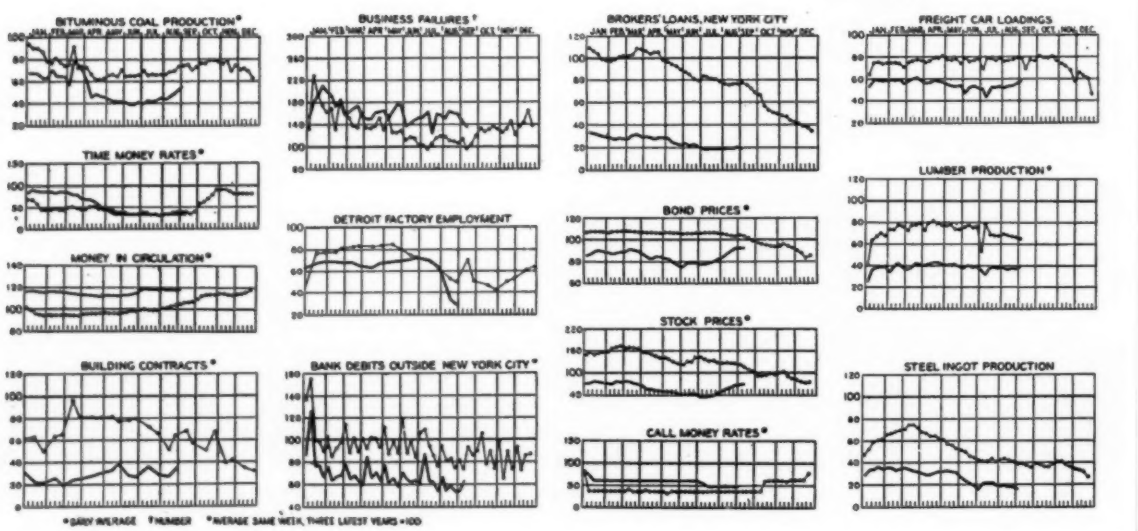
August contracts for new construction of all descriptions awarded in the 37 states east of the Rocky Mountains showed a gain of 4 per cent over July awards according to F. W. Dodge Corporation. The August figure of $133,988,100 compares with $128,768,700 for July and $233,106,100 for August, 1931. Gains over July were shown in building, both residential and non-residential, as well as in engineering works. The contract total for engineering works was only 12 per cent smaller than the total shown for this class of construction during August, 1931.

August contract totals reported for New England, Metropolitan New York, Upstate New York, the Pittsburgh area, the Southeast, the Chicago and the New Orleans territories were larger than those recorded in July. Of these major territorial areas the southeast reported a gain, also, over August of last year. Though the remaining six territories failed to score advances over July, gains over August 1931 were reported in the Middle Atlantic States and the Central Northwest.

For the first eight months of 1932 total construction awards in the 37 eastern states aggre-

WEEKLY BUSINESS INDICATORS

WEEKLY AVERAGE, 1923-1925, INCLUSIVE=100



gated $929,836,500 as compared with $2,311,598,100 for the corresponding period of 1931. Of the current year's total to date $203,205,600 was for residential building; $361,085,100 was for non-residential building; and the balance was for public works and public utilities.

Martinsburg Quarry Wins Crushed Stone Safety Contest

AMID strong competition from other members of the National Crushed Stone Association, the Martinsburg, West Virginia, Quarry 5 and 6 of the North American Cement Corporation won *The Explosives Engineer Award* for its 1931 safety record, it is announced by J. R. Boyd, secretary of the Association.

Sixteen of the many member quarries taking part in the contest worked the entire year without a lost-time accident. The Martinsburg quarry won the bronze plaque by operating 115,403 man-hours without a lost-time accident.

The other fifteen quarries, all of which received honorable mention, worked fewer man-hours. All companies receiving honorable mention are awarded parchment reproductions of the plaque.

The results of the annual contest are determined by U. S. Bureau of Mines, in that all members of this safety movement must be enrolled in the National Safety Competition, which is conducted by the Bureau of Mines for the famous "Sentinels of Safety" trophies. The leaders in the 1931 contest were as follows:

Winner.

Martinsburg Nos. 5 and 6 limestone quarry, Martinsburg, Berkley County, West Virginia, operated by the North American Cement Corporation. Quarry worked 115,403 man-hours in 1931 without a lost-time accident.

Honorable Mention. (All operated without lost-time accident.)

Rock Hill traprock quarry, Quakertown, Bucks County, Pa., operated by the General Crushed Stone Co. Quarry worked 112,819 man-hours in 1931.

Hillsville crushed limestone quarry, Hillsville, Lawrence County, Pa., operated by the Union Limestone Co. Quarry worked 99,622 man-hours in 1931.

Columbia No. 3 limestone mine, Valmeyer, Monroe County, Ill., operated by the Columbia Quarry Co. Worked 97,788 man-hours in 1931.

Birdsboro crushed-stone quarry, Birdsboro, Berks County, Pa., operated by The John T. Dyer Quarry Co. Quarry worked 91,209 man-hours in 1931.

Akron limestone quarry, Akron, Erie County, N. Y., operated by the General Crushed Stone Co. Quarry worked 89,764 man-hours in 1931.

Rock-Cut limestone quarry, Syracuse, Onondaga County, N. Y., operated by the General Crushed Stone Co. Quarry worked 84,004 man-hours in 1931.

Security limestone quarry, Security, Washington County, Md., operated by the North American Cement Corp. Quarry worked 80,011 man-hours in 1931.

Middlefield traprock quarry, Wallingford, New Haven County, Conn., operated by the Connecticut Quarries Co., Inc. Quarry worked 78,123 man-hours in 1931.

Knippa No. 4 traprock quarry, Knippa, Uvalde County, Texas, operated by the Southwest Stone Co. Quarry worked 67,816 man-hours in 1931.

Gasport dolomite quarry, Gasport, Niagara County, N. Y., operated by the Wickwire Spencer Steel Co. Quarry worked 63,340 man-hours in 1931.

Speed Mill cement quarry, Speed, Clark County, Ind., operated by the Louisville Cement Corp. Quarry worked 57,366 man-hours in 1931.

Hendlers quartzite quarry, Wilkes-Barre, Luzerne County, Pa., operated by the General Crushed Stone Co. Quarry worked 45,045 man-hours in 1931.

Duluth traprock quarry, Duluth, St. Louis County, Minn., operated by the Duluth Crushed Stone Co. Quarry worked 42,078 man-hours in 1931.

Rocky Hill traprock quarry, Rocky Hill, Hartford County, Conn., operated by the Connecticut Quarries Co., Inc. Quarry worked 33,521 man-hours in 1931.

Mt. Carmel traprock quarry, Mt. Carmel, New Haven County, Conn., operated by the Connecticut Quarries Co., Inc. Quarry worked 17,224 man-hours in 1931.

The Moan of the Low Bidder

By Spencer A. Jones

My lump sum bid is low, you say?
How much? Five thousand!!! Well, I'll lay
A bet with anyone that I
Forgot and didn't multiply,
Or else I've left the profit out.
Great balls of tar! That's it, no doubt!

How did the unit prices run?
My gosh! I'm low on every one!!!
I'm low on earth; I'm low on rock;
I'm low on borrow—that's a shock!
They've got my check for ten per cent,
And now I'm stuck, that's evident.

Who's going to inspect the job?
Oh, I know him, the dirty slob!
He wouldn't give a guy a break,
And all he does is bellyache.
Aw, shucks! Come on, let's move some dirt,
Here's one more time I lose my shirt.

OLD TIMERS!!!

Can You Answer These Questions?

Every now and then, Excavating Engineer is asked concerning some old timer, some old machine, or some old practice.

Here are some recent requests. Can you answer them? Can you supply the information asked?

Both the Questioners and Excavating Engineer will appreciate hearing from you. Published replies will be paid for.

Have you a picture of the old Cross Excavator — particularly the second machine that was built for Mathews as a back digger? Did you ever see it? Can you describe it? Where was it used?

Does anyone know where "Whiskey Bill" is? Many old timers will recall that crack operator of the old days in Illinois, who was known far and wide as "Whiskey Bill". It is rumored that he is dead. Do you know? What was his last address?

Have you a snap shot or photograph of one of the Old Rood machines? Do you remember the old double boom machines that worked in Illinois, Minnesota and Iowa in the 90's? Do you know of anyone now living who operated them?

FIELD NOTES

Quickest Way to Estimate Length of Material in Any Roll

MOST engineers are users of considerable material that comes in rolls—paper, hose, belting, cables, wire, rope, roofing insulating material, chains, etc. and the question often arises, "How much material remains in that roll?" or, "Does the original roll contain full length?"

Here is a simple rule of my own derivation which I contend is the simplest possible. Make the one measurement "S", as shown in the sketch herewith, in inches. Then count the number of turns. Multiply the two together and then multiply that by 0.2618. The result is the length of the roll in feet.

For example, if the distance S is 10 inches, and the number of turns is 10, the roll contains 26.18 feet.

This holds true regardless of whether the material is paper, leather, or anything else. The thickness of the material does not make any difference.

To check the rule, take an instance where we have only one single turn of belting, the distance S being 10 inches. The roll, then, is a true circle, and the distance S is the diameter of that circle. The length of the belt, of course, is equal to the diameter times 3.1416 or, 31.416 inches. Now divide that by 12 and you will get 2.618 feet, as per the above rule.

Even if the roll is so tightly wound that there is no visible hole through it, the rule still holds true. And, ditto, if it is loosely wound.

—*W. F. Schaphorst, M. E.*

Contradicting Excavation Contracts

WHEN an excavating contractor is about to put his "John Hancock" upon a written contract, he should bear in mind a fundamental rule of law that is just as well settled as it is commonly overlooked. That rule is that neither party to a written contract will be permitted to deny that it correctly states the agreement, unless he can show that through fraud of the other party or *mutual* mistake it fails to express the true understanding. Obviously, then, it is important that the contractor know clearly just what he is signing; he cannot later avoid his written obligation on the ground that he signed it in haste because he was in a hurry to get to lunch or a golf course.

The rule was involved in a case decided by the West Virginia Supreme Court of Appeals (Corns-Thomas Engineering & Construction Co. v. McDowell County Court, 115 S. E. 462). It was decided that if a contract was awarded with reference to an existing plan showing the depth to which certain excavation was to be carried, neither party could contradict the agreement on that point by showing that when the contract was signed, or before, it was verbally understood that the excavation was to be made to another grade.

However, in that case, the contractor was upheld in right to recover compensation on proof of a verbal agreement as to the depth that excavations were to be made; the working plans and contract being silent on that point. In other words, where a written contract is silent on a material point, the agreement on that point can be proved by showing a verbal understanding between the parties. —*A. L. H. Street, Attorney-at-Law.*

Nocturnal Thievery Stopped by Searchlight

INSTALLATION of a police boat type of searchlight at the plant of the Trinity Portland Cement Company caused the cessation recently of a series of nocturnal thefts of valuable company property. The night watchman had been prevented in his attempts to prevent the stealing by threats from the thieves.

Cable and any other equipment which could be sold were removed in open defiance of the watchman. A large amount of copper had been taken from a 2300-volt transmission line, and also rubber-covered portable cable. On one occasion the watchman had come upon three men taking portable cable and, as he approached one of them, the other two took positions on either side of him while the trio ordered him on his way.

General Electric engineers suggested the use of a searchlight. Accordingly a form J-68 Novalux searchlight of the type used on police boats was installed on top of a small building situated on a hill and thus commanding a view of all sections of the property. The light is controlled from inside the building, and can be turned in any direction.

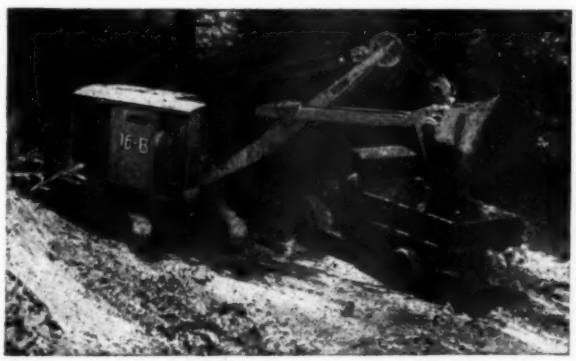
Above: The lens of this electric "policeman" is 12 inches in diameter. On 110 volts it produces a light of approximately 1230 candle power. Its beam at 320 feet is 40 feet in diameter. Right: The control. Below: Watchman's tower overlooking the quarry, showing searchlight.

The watchman now stays in the tower all night, punching a clock at regular intervals. He very readily spots the beam, by the feel of the handle, with the light off, on any point in the quarry he wishes to check. He then turns the light on with the beam already directed. Thus, if anybody were at the point in question, he would be taken unawares. A rifle completes the watchman's equipment.

Nothing has been lost from the quarry since the installation of the light.

EQUIPMENT YOU OUGHT TO KNOW ABOUT

New 16-B Excavator Announced



A NEW ½-yard excavator to be known as the 16-B has been announced by *Bucyrus-Erie Company*, South Milwaukee, Wisconsin. This new machine combines greater digging ability per pound of weight than any machine that has ever been offered. Its weight is under 30,000 pounds and its big 6-cylinder gasoline engine develops 54 H.P. This remarkable combination of digging ability, sturdy strength and light weight has been brought about by a complete new design unhampered by tradition, a design which has incorporated in it all the mechanical refinements that are suggested by 50 years of excavating machinery building.

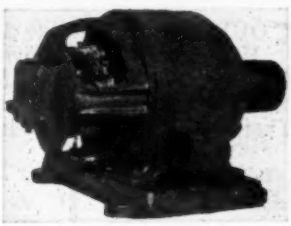
Dirt moving men inspecting the machine are impressed by the many new features, among them the following: conical swing rollers rolling between two roller paths eliminating center pintle and center pintle adjustment, elimination of dead-weight, no dead counterweight, chain-crowd with high speed retraction, unit assembly, single-shaft-drive mounting, climbs grades of 30 percent easily, all clutches interchangeable, all welded box-girder boom and outside sticks, a very efficient digging and free-dumping inserted-tooth dipper, greater horsepower per pound of weight than any other ½-yard shovel. Choice of gasoline, Diesel or electric power, two-speed propel available, high speed independent boom-hoist available. The machine is very readily convertible — shovel, dragline, clamshell, crane, dragshovel or skimmer scoop. Write for complete information, mentioning this magazine.

New Type of Explosive

A SERIES of explosives of a radically new type, known as "Red Cross Blasting Nos. 2, 3 and 4 F. R.," has been developed by the Explosives Department of *E. I. du Pont de Nemours & Company, Wilmington, Delaware.* These so-called free-running powders actually are dynamite of special grades in loose form. They are particularly designed for use in sprung holes and Red Cross No. 2 F. R. is especially adapted for replacing black powder in this work. Nos. 3 and 4 F. R. are well adapted for top loads in certain types of well drill work. No. 4 F. R. is said to have considerable advantage for road work, as many road contractors are using air drills and loading the holes with the stick dynamite, which is a relatively slow process. Further information will be sent gladly by the manufacturer. Mention *Excavating Engineer*, please, when writing.

New Line of Direct Current Motors

A NEW LINE of direct current motors, has been developed by the *General Electric Company, Schenectady, New York.* According to the manufacturer, it embodies refinements of design and construction that are a distinct contribution to the general-purpose d-c. motor field. Mechanically, these motors are so designed that many variations, such as different degrees of enclosure for various applications, can be accomplished by using only a few different parts. New and radically different pulley-end shields afford maximum protection to the motor windings. Drop-forged feet welded to the motor frame reduce the possibility of breakage. The improved insulation used is resistant to moisture and weak acids. Properly proportioned stabilizing windings make possible unusually stable operation. In addition, the speeds of all constant-speed motors can be increased 25 per cent, and more in some ratings, by field control. For further information write the manufacturer, mentioning this magazine.



New Type Tire Offered by Goodrich

ANNOUNCEMENT has recently been made by *The B. F. Goodrich Company, Akron, Ohio,* of a new type of high traction tire known as the "Zero Pressure", perfected to meet the needs of tractor service. It is so named because it has cushioning qualities equal or better than a pneumatic, yet has no air under pressure within the tire.

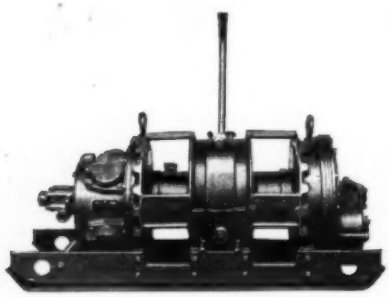
Outstandingly successful in road work during a long experimental period, the manufacturers believe that the "Zero Pressure" can be adapted to all kinds of work that a tractor is called upon to perform, in a manner that has never before been possible with pneumatic or solid tire equipment. It is designed to provide a snow-shoe effect in loose or soft soil, or sand, having a tread which deflects readily under load and provides unusual tractive qualities. As the tire is not under air pressure, no penetrating obstacle can damage it or cause delay.

The tire consists of a rubber arch built on a slotted steel base for application to solid tire wheels. The piers of the arch are of sufficient size and rigidity to provide ample carrying capacity.

The all-rubber arch is very flexible, and gives full tread contact. In service it assumes a concave tread profile under load. In sand or soft soil, this results in packing the material under the center, producing a track to ride on and causing it to ride on top of the loose material rather than dig itself in. Being flexible without air pressure, it does not bounce when it encounters an obstruction, but rolls evenly over all obstacles thus increasing traction and eliminating wheel chatter. It makes possible lighter wheel installations and power otherwise needed to move heavier wheels can be utilized in directly attacking the job, meaning a saving in gas and oil, etc. For complete information on this new development, write The B. F. Goodrich Company. Please mention *Excavating Engineer.*

Double-Drum "Utility" Air Hoists

FOUR sizes of portable double-drum "Utility" Air Hoists have been developed by *Ingersoll-Rand Company, 11 Broadway, New York.* They are said to offer many advanced and distinctive features. Their application is in slushing and scraper loading in mines and quarries, sand and gravel pits, etc.



An outstanding feature of the hoists is the single-lever control of the clutches and throttle valve, giving ease of operation and safety. Swinging the control lever sideways engages the clutch for either of the two drums and pushing it forward admits air to the motor. The speed of the motor is controlled by the forward position of the lever. Variations in drum speeds are regulated by the lever and without the need of slipping the clutch. Furthermore, the motor need run only when the hoist is actually pulling, thus reducing air consumption. The lever automatically returns to neutral if released — a safety feature.

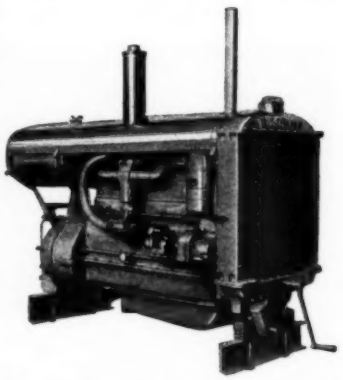
Compact cylindrical cast-steel housing construction fully encloses and protects the drums, clutches and brakes and assures proper alignment of all the moving parts. An internal expanding clutch is provided for each drum, operated by the single lever. Only one clutch can be engaged at one time. The main gears are of the helical type, reducing tooth pressures and insuring quiet operation.

The air motor is of the radial-four cylinder type similar to that used in single-drum "Utility" hoists —a design proved dependable and efficient for hoist service.

The entire hoist is mounted on steel skids, giving a strong and convenient arrangement for spragging or mounting and also helpful in moving a hoist by its own power. The four sizes have rated capacities of 1500 and 2000 pounds at various speeds and air pressures. Complete information will gladly be sent by the manufacturer upon request.

New Allis-Chalmers Power Units

THREE NEW stationary power units have been announced by the *Allis-Chalmers Manufacturing Company, Tractor Division, Milwaukee.* They are: Model E-50, a four-cylinder units with a 4¾ x 6½ engine; disc type clutch as used in the Allis-Chalmers Model "35" tractor and steel belt pulley. Weight, 2,000 pounds. Model E-60, a four-cylinder unit, 5¼x6½, oversize radiator, disc type clutch (as in the Allis-Chalmers "35") and steel belt pulley. Weight, 2,000 pounds. Model U-40, a four-cylinder unit, of lighter weight. Motor dimensions 4½ x 5, as in the Allis-Chalmers Model "U" tractor. Weight, 1,500 pounds.



Oil filter and air cleaner are standard equipment on all models. Each unit is equipped with a fuel tank, radiator, starting crank, magneto, carburetor, governor, air cleaner, clutch and belt pulley. Texrope drives can be used on any unit. Complete information can be obtained upon request to the manufacturer. Please mention *Excavating Engineer* when writing.

Signaling Device and Stop Mechanism for Ditching Machines

ROY D. PAVLIK of Pavlik Brothers, Kenilworth, Illinois has recently secured a patent on an interesting device which is claimed to prevent multiple bucket trenching machines from cutting into pipes and telephone cables underground. The device consists of an electrically controlled operating mechanism to give a suitable warning when one of the members comes into contact with any portion of an underground piping system. It provides a normally open control electric circuit operated from a battery and grounded on the metallic structure of the digging machine with the other end connected with some convenient portion of the piping system such as a water plug or similar device in the vicinity of the place where the digging operations are taking place.

The inventor claims that when one of the metallic digging members comes in contact with an underground pipe or metal conduit the control circuit is completed, thereby actuating a series of relays or electro-magnetically operating devices which close and remain closed until released by the operator. Pavlik Brothers advise that they tried out the device on a Barber-Greene machine on a trench job at Winnetka, Illinois with very satisfactory results. Three pipes and one telephone cable were struck, two of these being of cast iron and two of lead. The warning device operated in each case at the first slight contact and in no case was there more than a scratch on the pipes or cable. If you are interested in further information write to *Pavlik Brothers, Kenilworth, Illinois.*

He-man: "I like any wild game."
Clinging Vine: "Oh, teach me some new ones!"

Development Work at Churchill Harbor

(Continued from page 476)

northerly storms, the only direction from which winds can affect the anchorage. Rough waters outside the entrance confined the hoppers within, and part of the material had to be discharged on the westerly side of the harbor. Dredging work was carried on practically continuously, a system of double crewing being used, with each shift working from eight to ten hours throughout the season.

The 1931 program of work was a continuation of that of the previous year, the dock being completed to its full length of 1,800 feet. Dredges continued the work on the ship channel in addition to excavating the necessary crib seats for the wharf, moving a total of close to 550,000 cubic-yards during the entire season.

Work on the railway yards and terminal buildings, commenced in 1929, reached completion in the fall of 1931. The yards are situated approximately one mile south of the elevator and dock sites and were constructed by the forces of the Canadian National Railways. The terminal buildings include a six stall brick roundhouse, 90-foot twin-span turn-table, 60,000-gallon water tank, 100-ton mechanical coal dock, single depressed ashpit, sand-drying plant, freight sheds, ice house, and enginemen's and trainmen's bunkhouses.

The grain elevator at Churchill is claimed to be the fastest of its kind in Western Canada. This structure is located at the east side of the dock, a distance of 600 feet from the water line. Construction was commenced in the spring of 1930, and the building completed on September 15th, 1931. The design and supervision of the erection was done by the C. D. Howe Company, of Port Arthur. The construction was under contract by the Carter, Hall, Aldinger Company, of Winnipeg, Man. The completed layout consists of the storage annex, of 2,000,000 bushels capacity, dryer, work-house, capable of storing half a million bushels of grain, office building, powerhouse and trackshed. The trackshed is served by four unloading tracks, each equipped with rocker dumper capable of unloading one car of grain every seven minutes.

The grain is delivered, by conveyor belt system, through an overhead gallery running from the workhouse to the dock and along the dock front. The four-belt conveyor system has a capacity of 80,000 bushels per hour. The grain gallery is of structural steel, 1,450 feet in length, and equipped with twenty-three boat spouts for the loading of grain. Four spouts were installed to handle the 1931 test shipment, the remainder now being under construction.

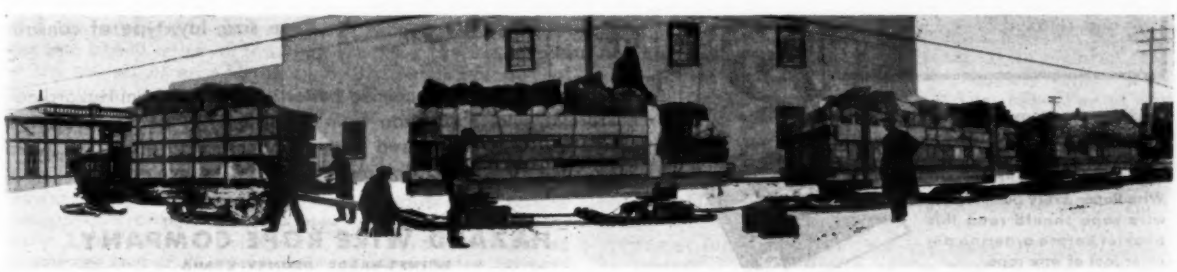
Old and new methods of transportation. A winter scene showing dog teams and the more modern methods of far north travel, an airplane. The Bucyrus-Erie 6-8 yard dipper dredges in winter quarters are in the right background.

At the time of writing the dock is being prepared to take the foundations of the grain gallery extension and the terminal sheds. The latter, of which there will be two, will have a total capacity of 40,000 tons. In addition to this, coal storage is to be provided on the dock to take care of 40,000 tons.

Engineering work in connection with all phases of the harbor development comes under the Department of Railways and Canals, Col. A. E. Debuc, chief engineer, and D. W. MacLachlan, engineer-in-charge. George Kydd is resident engineer.

A policy of "closed doors" has been in force at the northern port, and will be until facilities are provided to take care of the needs of settlers. The town of Churchill up to the present time, has been of a temporary nature only, made up of construction camps, with little or no resident population. The administration of the townsite is in the hands of the Provincial Government, (Manitoba) and has already been surveyed by the provincial engineers. The present intention is to lease the lots on long term leases, in order to prevent speculation.

It is expected that Churchill will be opened to settlers in the early fall of this year, beginning the real growth of Manitoba's seaport. The hopes of western Canada are high in the expectation of the wealth of trade that this old, yet new, line of communication with the Old World will bring.



Supplies were hauled from Amery to Nelson over the abandoned railroad grade and thence over the ice to Churchill in sleigh trains hauled by Linn tractors. This view of a Linn sleigh train was made at The Pas.

LAY-SET SAVES YOU MONEY

BECAUSE IT GIVES MUCH LONGER SERVICE

LAY-SET gives service which averages between 30% and 300% longer than given by non-preformed rope of the same grade and construction, the variation depending entirely on the nature of the work and type of equipment.

NOTE THE HELICAL SHAPE OF THE REMOVED STRAND

This illustration is made from an honest unretouched photograph. Note how you can remove a strand. You can turn it end for end and fit it back into position, which demonstrates the perfect balance of LAY-SET strands.

Note also that the ends need no seizing—there is no internal stress. Strands and wires lie naturally in position, free and relaxed.

Send for your copy of this interesting booklet which explains and illustrates 12 advantages of LAY-SET Preformed Wire Rope. Every purchaser of wire rope should read this booklet before ordering another foot of wire rope.

Preforming is a Patented Manufacturing Process ..not a Type of "Lay" or Construction

We find that it is not clear in the minds of some wire rope users that Lay-Set Preformed Wire Rope can be furnished in every lay, type of construction, and grade of wire rope in general usage today. There are four basic wire rope "lays" which are as follows:

Right Lay, Regular Lay

Left Lay, Regular Lay

Right Lay, Lang Lay

Left Lay, Lang Lay

The above four lays are also furnished with an independent wire rope center instead of a hemp center.

Also, there are various types of wire rope constructions known as "Seale," "Warrington," "Filler Wire," etc., having to do with the number, size and arrangement of the individual wires, and are furnished in the various lays illustrated above.

In addition, there are different grades, such as Iron, Traction Steel, Cast Steel, Mild Plow Steel and Improved Plow Steel. (Hazard's "Olympic Green Strand" is Improved Plow Steel).

The point to remember is this . . .

Lay-Set Preformed Wire Rope is furnished in all sizes, lays, types of construction and grades . . . and gives increased service over non-preformed wire rope of the same size, lay, type of construction and grade.

While you may be receiving better satisfaction from Hazard non-preformed wire rope than from other brands of non-preformed wire rope, we recommend that you be sure to insert the words "LAY-SET PREFORMED" in your order.

HAZARD WIRE ROPE COMPANY
WILKES-BARRE, PENNSYLVANIA

New York Pittsburgh Chicago Denver Fort Worth Los Angeles
San Francisco Birmingham Philadelphia Tacoma

For your convenience in writing to Hazard Wire Rope Company you will find a card bound in this issue.

SHOTS FROM THE FIRING LINE

Pennsylvania to Use Road Dollars for Roads Only

AFTER a state-wide storm of protest against the appropriation of road funds for unemployment relief, a general sales tax of one per cent applying to nearly all commodities was recently adopted by the Pennsylvania legislature. This was done in preference to diverting $12,000,000 from motorist-contributed road funds. This action requires all citizens to share in the general costs of government in proportion to their spending ability. Also thousands of men keep their road jobs and will not be placed on the dole lists.

Private Vehicle Subway Provides Store With Ample Shipping Facilities

A PRIVATELY-OWNED street, cut through rock 42 feet below the ordinary street level, is an unusual feature of the new Wanamaker Men's Store, Philadelphia, to be opened early this month as the largest store of its kind in the world. The street will be used for the loading and unloading of the store's delivery trucks. Its existence was made necessary by the congested traffic conditions at Broad and Chestnut Streets, where the new store is located.

A large van elevator with a capacity of 25,000 pounds will carry trucks to and from the ordinary street level to their underground destination. The underground street is 82 feet long and 56 feet wide. It provides room for ten trucks to load or unload at the same time. Additional underground space is occupied by the 20-foot wide loading platforms which surround the street.

The new store is housed on the lower eight floors of the recently completed 26-story Lincoln-Liberty Building. Provision has been made so that if it becomes desirable in the future, the van elevator can be run up to the floors above the street level, making is possible to load a truck at any floor and send it out of the building ready to begin its round of deliveries.

Many States Plan Early Start on Highway Improvements with Emergency Federal Aid Funds

QUICK action in making use of the $120,000,000 emergency Federal Aid loan will soon place thousands of men at work. Minnesota already has made tentative awards for construction of 129 miles of concrete pavement with her share of the loan fund. New York has slated 190 miles of concrete for early building; Illinois, 210 miles; Nebraska, 57 miles; Oklahoma, 109 miles; and Georgia has let contracts for 66 miles with lettings soon to be made for $2,500,000 worth of additional road betterments.

Asphalt Paving Conference to Hear of Pennsylvania's Solution of Farm-to-Market Road Problem

"HOW Pennsylvania is solving on a large scale the problem of farm-to-market roads through the improvement of 20,000 miles of township roads by the state" will be the subject of an address by S. S. Lewis, Secretary of Highways, at the Tenth Annual Asphalt Paving Conference to be held at New Orleans during the week of December 5th.

This type of practical farm relief, which Governor Pinchot made a successful issue in the 1930 election, is demonstrating its feasibility both in magnitude of results accomplished to date and economy of operation, since already 3,659 miles of the system have been completed at an average cost of $5,300 per mile, affording to the farmers dustless, mudless roads usable throughout the year.

Mr. Lewis' address will form part of a program designed to show how progressive states are solving the low cost road problem and making the highway dollar reach farther than ever before in the course of good roads movement.

Foreign

Alaskan Notes

L. B. Spaulding sends us through the Clyde Equipment Company of Seattle a collection of interesting snap shots showing the erection of the above Bucyrus-Erie 37-B at Iditarod, Alaska. The knocked-down machine was loaded on a river boat and barge and brought up the river from Holy Cross to Iditarod where erection was started on June 1st. Mr. Spaulding with the help of four men finished the job in five and one-half days and with nothing to work with but a couple of jacks. The machine then moved out under its own power to the camp and workings where it arrived June 11th. It is being used by the **Northland Development Company** on a placer gold operation. When Mr. Spaulding wrote July 4th the sluicing was well under-way and he comments that their dirt looks good.

Argentina

On July 18, 1932, a bill was introduced into the Argentine Chamber of Deputies, providing for a **National Highway Law.** The introduction of this bill is another effort which reveals Argentina's growing desire for a national law to coordinate all federal road building and federal highway aid to the various provinces with a definite construction program and a continuous highway fund, all to be managed by a national highway bureau.

Cuba

Since the completion of the Cuban Central Highway in February, 1931, the Cuban Department of Public Works has undertaken very little highway construction of major importance. Work on the road from **Habana to Cacahual,** to cost approximately $1,000,000, is progressing rapidly and should be finished in September of this year. The construction of a two-way boulevard, "Avenida del Puerto," along the sea wall in Habana, is nearing completion. This avenue will materially improve the appearance of the harbor entrance, and substantially relieve traffic congestion in the narrow streets of the older business district.

Manchuria

Officials of the new Manchurian government in Changohun are working on a **new road building program** designed to extend over a period of ten years. It is believed that the original plan will include approximately 18,600 miles and will cost upwards of 30,000,000 Yen. (The Yen at par equals $0.4985). According to present plans comparatively little modern road building machinery and equipment will be utililized and most of the roads will be only dirt or tar surfaced. The government also faces a serious unemployment problem and will find it advantageous to utilize hand labor.

Present indications are that the roads will be designed as feeders to the railways rather than as a competitive factor in transportation. Most of the roads which are expected to be among those receiving first attention connect

the railway with outlying districts, and no connected plan for trunk highways appears probable. The present plan will be beneficial to the district as a whole, as it will not only permit the easier movement of passengers and goods but will assist also in the policing of various areas.

Canada

A new 65-mile link in the provincial **highway connecting Toronto and Ottawa** has been completed at a cost of $1,250,000. This road is laid through the picturesque Rideau Lakes region, where numerous engineering difficulties were overcome. Due to scenic advantages it will be used largely by tourist traffic.

A new highway connecting Hamilton, Ontario, with the Peace Bridge at Fort Erie on the Canadian side of the Niagara River, is under construction at a cost of approximately $500,000. 15 miles are to be of cement concrete and 11 miles of asphalt.

A new highway from Winnipeg to Kenora, Ontario, at Lake of the Woods, a distance of 145 miles, recently was opened to traffic. This road forms an important link in the projected Trans-Canada Highway. 112 miles are in Manitoba and 33 miles in Ontario.

Philadelphia and Vicinity

By M. G. CONWAY

Roy Maxwell has about 80,000 yards of his 90,000 yards in Wayne County completed. Roy subbed this work from the **York Engineering Company** of York. He has his Bucyrus-Erie Gas+Air and a Lorain 75 on the job. Charlie Weiland of Allentown is doing the trucking.

Robert Kintzer of Robesonia has his job at West Milton about 85% completed. He subbed this work consisting of 108,000 yards of excavation from **D. L. Risser & Sons** of Lebanon. Mr. Kintzer has his Gas+Air and Koehring 301 on this job and also Chris Landis of Dallastown with his Lorain 75 and Martin Brothers of Lancaster with their Byers Master.

Wm. Eisenberg & Sons of Camden, N. J., are just starting their 90,000 yard job in Pike County, Pennsylvania. They have their 37-B Bucyrus-Erie shovel and Koehring 301 on the job and are starting off in some nice looking digging.

This company is also low bidder and the contract has been awarded for the construction of Route No. 2, Section No. 9, New York State Line to Franklin Turnpike, Bergen County, New Jersey—length 3.767 miles—involving approximately five hundred thousand yards of excavation.

Contract has also been awarded them for construction of Route No. 40, Section No. 8, Kings Highway to Marlton, Camden and Burlington Counties, New Jersey—length 4.654 miles—involving approximately two hundred and fourteen thousand yards of excavation.

Taking into consideration the work being done by their Bucyrus-Erie types "B" and "GA-2" machines, William Eisenberg & Sons have approximately one million yards of excavation at the present time. We wish them the best of luck with this work and expect to watch their jobs closely during the next couple of months.

Virginia Notes

A contract for the construction of an underpass under the Richmond, Fredericksburg & Potomac company's tracks at Lombardy street, Richmond, has been awarded to the **City Building Corporation**, Richmond. The City of Richmond is to pay 25 per cent of the cost of the project, which is estimated at $65,000 or $75,000.

North Carolina Notes

By E. F. CRAVEN

North Carolina has had two Highway lettings, totaling approximately a million and a half dollars, since the latter part of August. A third letting is to be held about the middle of September. This expenditure is part of the five and a half million dollars coming through the Federal Government. The buzz set up from this work sounds good, as this is the first real work N. C. has done in the past few years.

The Federal Government is expecting to start work soon on the **Smokey Mountain National Park Projects** in Western North Carolina and Eastern Tennessee. At present, the right-of-ways of the State Highways which pass through the Park are being cleared of debris. It is understood that construction of the "Skyland Highway" will be started this fall. This road will be the "Main Street" of the Park, and will follow the Smokey Mountain Ridge.

C. O. Martin of Summerfield has subbed the State Highway work from E. F. Hester on the project between Madison and the Guilford County line. He has an Erie steamer on the job.

Power shovel work is picking up in this State after having been nil for the past two years.

Nello L. Teer is moving one of his Bucyrus-Erie Gas+Air shovels to the project near Raleigh which was awarded him recently.

E. W. Grannis is putting a Bucyrus-Erie Gas+Air on the Granville County job and a Lorain on the Wake County job. He is doing the last named job for E. A. Wood & Company.

W. E. Graham will grade the Stokes County job which was bid in by E. W. Grannis.

Kentucky Notes

By W. E. CHAMBERS

Raymond Contracting Co., of Bowling Green was awarded contract of $132,019 for surfacing 9 miles in Livingston County. **Wilmore Paving Company** of Middletown, Ohio received contract of $104,976 for paving with concrete 7.7 miles in Owen County. **L. E. Marks** of Bardstown was awarded contract of $27,203 for limestone surfacing 8.6 miles in Pulaski County.

Hart and Comadari of Huntington, West Virginia were awarded contract of $66,855 for grading and draining 7 miles in Breathitt County. **Campbell and Company** of Bowling Green were awarded 8.25 miles of asphalt surfacing in Edmonson County with bid of $50,168. **Jenkins Construction Company** of Williamstown on bid of $54,631 took contract for 9.4 miles of grading and draining in Harrison County. **Harper and Poage** of Cincinnati were awarded contract of $60,298 for 4 miles of concrete paving in Kenton County. **J. B. Westerfield**, Owensboro received contract of $9,159 for bridge in Logan County. **Clark, Kearney and Stark** of Rockwood, Illinois were awarded contract of $52,507 for 7 miles grading in Magoffin County. **Campbell & Johnson** of Pikeville were awarded contract for 6.9 miles grading in Magoffin County with bid of $60,000. **Lewis and Kelley** of Harlan received contract of $114,456 for 13.7 miles of grading in McCreary-Whitley Counties.

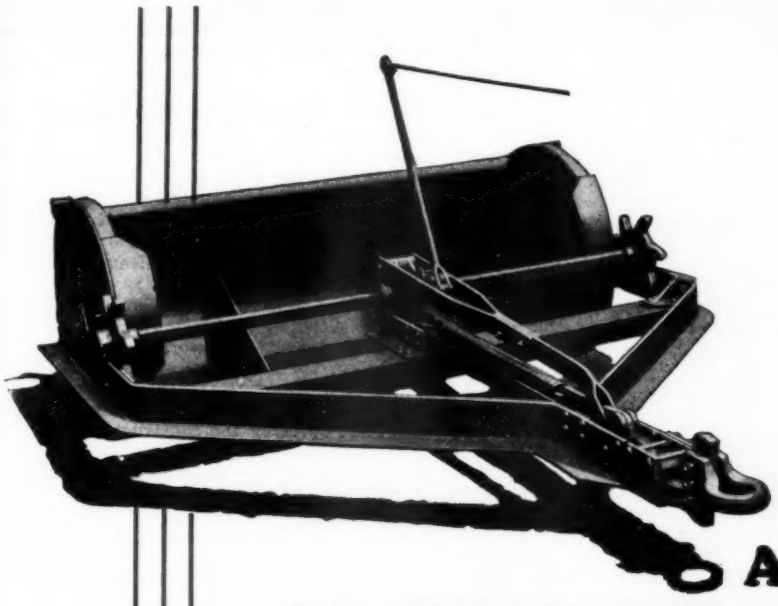
North Fork Construction Company of Jackson was awarded contract of $46,602 for 5.2 miles of grading in Morgan County. **Turman and McComas**, Huntington, West Virginia, $197,884 for 10.1 miles of grading in Floyd County. **Ruth Brothers**, Georgetown, $155,526 for 9.6 miles of grading in Knott County. **Langhorn & Langhorn**, Huntington, were given contract of $138,583 for 10.9 miles of grading in Perry County. **Consolidated Stone Company**, Louisville, $23,471 for 9.3 miles of limestone surfacing in Rowan County.

Greer and Jewell, Horse Cave, received contract of $25,608 for 4.7 miles of grading in Butler County. **Consolidated Stone Company**, 7.7 miles limestone surfacing in Caldwell County on bid of $19,161. **Robert M. Robinson**, Owensboro, $28,942 for 4.5 miles grading in Graves County. **Key Brothers Construction Company** was given contract of $21,976 for a bridge in Muhlenberg County. **The Highway Department will grade** the 7.5 miles in Pike County with the $89,362 set up for this purpose. **Land and Reed** of Brownsville were awarded contract of $16,102 for grading 5.5 miles in Warren-Edmonson Counties. **E. L. Traugber** of Elkton received contract for six miles of surfacing in Muhlenberg County, amount to be determined.

A policeman brought in a negro woman. The desk sergeant scowled and roared at her:

"Liza, you've been brought in for intoxication."

"Dat's fine," beamed Liza. "Boy, you can start right now."



A NEW TOOL TO MEET TODAY'S TOUGH OPERATING CONDITIONS

HERE is a new Western Rotary Fresno, the No. 35. In combination with a 35 H. P. tractor it forms a one-man dirt-moving unit particularly suited to meet today's tough operating conditions. It is fast, has a large capacity, and is ruggedly constructed—features that are essential to successful, economical Fresno operation.

The pan carries 34 cubic feet strike-off measure and, when loaded, the weight of the load, acting through a coil spring, causes the bit to leave the ground automatically. Like other Western Rotary Fresnos, all operations are carried on while the tractor is in continuous forward motion. The tractor driver easily controls each movement by means of a single trip-rope. There are adjustments that permit either a shallow or deep cut and the load may be spread in as thin a layer as desired.

For detailed information write for Bulletin 31-FK.

Western Rotary Fresnos are now made in 6 sizes—the pattern number indicating the horsepower of the tractor required.

Pattern	Cutting Width	Capacity Strike-off Measure	Weight	Power Any Type Tractor
No. 15	5′ 0″	17 cu. ft.	663 Lbs.	10-15 H.P.
No. 20	5′ 0″	17 cu. ft.	775 Lbs.	20 H.P.
No. 30	6′ 0″	22 cu. ft.	830 Lbs.	30 H.P.
No. H30	6′ 0″	22 cu. ft.	985 Lbs.	30 H.P.
No. 35	6′ 0″	34 cu. ft.	1215 Lbs.	35 H.P.
No. 60	7′ 0″	54 cu. ft.	2740 Lbs.	60-75 H.P.

WESTERN WHEELED SCRAPER COMPANY
DUMP CARS AND GRADING EQUIPMENT
AURORA, ILLINOIS, U. S. A.

WESTERN

For your convenience in writing to Western Wheeled Scraper Company, you will find a card bound in this issue.

Shots From the Firing Line—*Continued*

St. Louis and Vicinity

By A. J. KOENIG

At the letting at Jefferson City, on August 31, 509 bids were received on highway construction on which the total estimated amount was $2,500,000. The construction bids consisted of 42.2 miles of concrete paving, 31.6 miles of graded earth and 287.5 miles of graveled surface road—a total of 361.3 miles. The construction, divided into eighty-one sections, includes 31 bridges. The contracts under this letting call for the new employment regulations, the minimum wage on all projects involved being fixed by the Highway Commission at 35c per hour for unskilled and 50c per hour for skilled labor with a maximum week work not to exceed thirty hours and preference to be given to local labor.

Patton & Tully were low bidders for the construction of 14,500 lineal feet of piling dikes in the Missouri River at Cora Island and Amazon Bend.

Hartman-Clark Bros. with a bid of $243,165, was low for the construction of 10.16 miles of brick surfacing in Fayette and Effingham counties, Illinois.

R. B. Potashnik was awarded contract for the construction of 5,200 feet of solid dikes near Alton at a price of $205,345.

The U. S. Engineers office at Memphis let contract to **Mack Construction Co.** for constructing approximately 27,000 cubic yards of levee construction near Caruthersville. **The Hoeffken Bros. Construction Co.** was awarded contract for the construction and improvement of the old Vincennes road for a distance of 1.2 miles to Illinois State Highway No. 12. Their contract calls for grading at $28,191; paving with 20-foot slab at $16,591 and bridging at $6,789.

Cameron-Joyce and Company have completed the 18 miles of 20-foot slab an Highway 54 between Mexico and Laddonia, Mo.

Martin & Riley Contracting Company was the low bidder among sixteen bids received for the construction of the Kingshighway-Lake relief sewer. Their bid of $58,938 was 36 percent below the engineers estimate. The sewer will be constructed of brick with a diameter varying from 3 to 5 feet and will connect with the River des Peres Tube.

Tritt Bros. Construction Company was awarded contract for grading the highway from Five Forks School to Black Quarter in St. Clair County, Illinois. **Bauer Bros. Construction Company** has the contract for the erection of a sixteen span bridge over Silver creek in St. Clair County.

The Union Bridge & Construction Company was awarded contract for 1000 foot of revetment in the Mississippi River near Cape Girardeau.

McCarthy Improvement Company was awarded a contract for highway grading in Henderson County, Illinois.

Missouri Notes

By R. K. HALL

Hume-Sinclair Coal Mining Company of Kansas City, Missouri recently had occasion to move their big Bucyrus-Erie 750-B, 16-yard counterbalanced hoist stripper across country. The illustrations herewith show how easily these giant machines maneuver even in a damp country field. Note the sharp turn as evidenced by the tracks at right and left.

River Notes

Contracts for the second and third units of a $3,500,000 project for the Courtableau flood control spillway were recommended for award by the U. S. District Engineer Office at New Orleans. These two contracts involve a total of $1,658,896. **The McWilliams Dredging Company,** New Orleans, was recommended on bid of $549,916 for a project involving 3,155,000 cubic yards of dirt for a proposed levee along the Atchafalaya River, from Bayou Courtableau to Cataboula, a distance of approximately 30 miles. **The Trinity Farms Construction Company,** Dallas on a bid of $1,108,980, was recommended for award to move 7,460,000 cubic yards of earth in a project from Bayou Courtableau to Henderson, a distance of 20 miles.

Preliminary work was started several weeks ago with 200 men employed to clear right-of-way from Palmetto to route 7 bridge on Courtableau. This work is being done by the Trinity Farms Construction Company. More than two years will be required to complete the entire project.

Bids will be taken by U. S. Engineers Office at Rock Island on October 18th covering the construction of a lock at Lock and Dam Number 20, Mississippi River, in the vicinity of Canton, Missouri. The work will consist of the construction of the main lock and the upper part of the auxiliary lock and includes coffer dam to inclose 1,480 lineal feet of work, common excavation of 8,250 cubic yards, rock excavation of 73,370 cubic yards and 38,360 square feet of rock channeling in addition to 72,150 cubic yards of fill and 2,100 cubic yards of stone rip-rap. The contract will be awarded as a whole to one bidder and is to be made in accordance with the special provisions of the Emergency Relief and Construction Act including among other regulations a 30-hour week for employees except those in supervisory capacities. Plans and specifications covering this work are on exhibition at the U. S. Engineer Offices at St. Louis, Cleveland, St. Paul, Chicago, Cincinnati, Pittsburgh, Philadelphia, Kansas City and New York. Information concerning this work may be obtained by addressing Lt. Col. Glen E. Edgerton, District Engineer, Rock Island, Illinois.

Southern Notes

By W. W. WHORLEY

Callahan-Walker Construction Company is making excellent progress on their levee work near Avon, Mississippi. Keith Wasson is superintendent in charge.

Lewis-Chambers Construction Company has moved one of their Class 230 draglines to their job near Waterproof, Louisiana, along with a 52-B Diesel dragline. C. J. Phillippe is in charge. This firm is also operating a Class 230 dragline, assisted by a 45-B on their work near Chatham, Mississippi under the supervision of A. H. Milam.

E. F. Powers Construction Company made an interesting move of their levee equipment in August. Their entire outfit, consisting of two tower excavators, small draglines and hauling equipment, was loaded on a large barge and moved from Lake Village, Arkansas to new work near Commerce Landing, Mississippi. The large barge used is owned by **Boyce & Igo** and was especially designed to move their Bucyrus-Monighan 8160 dragline.

Barker Brothers of Fort Worth, Texas, are making splendid progress on their sub-contract under Walter Dennison near Hillhouse, Miss. on the Mississippi River levee system. During the month of August they loaded 87,000 yards with their 37-B dragline. Mr. John Lane is in charge of operations.

FULL LOADS on the soft fill...

THE dirt keeps rolling in here to build up a low spot—the "Caterpillar" Tractor shuttles steadily back and forth over the soft fill, spreading big blades of material easily and accurately. And another important detail on the West Float Extension Works of the Mersey Docks and Harbour Board (England) is completed on time and at a low cost.

Whether the load is heavy wagons, big scrapers or other equipment—whether working conditions are good, bad, or extreme—you can depend on the all-weather traction, the generous power and rugged stamina of the "Caterpillar" track-type Tractor to handle the job. On the wide variety of work for which this tractor is suited, it's the world's champion at producing better, quicker, cheaper results!

Your "Caterpillar" dealer is experienced at supplying power equipment to fit jobs and conditions. Ask him for complete information.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.
Track-type Tractors Road Machinery
Combines

(There's a "Caterpillar" Dealer Near You)

Prices — f. o. b. Peoria, Illinois

FIFTEEN . . .	$1100	THIRTY-FIVE .	$2400
TWENTY . . .	$1450	FIFTY	$3675
TWENTY-FIVE	$1900	SIXTY-FIVE .	$4350
DIESEL		$6500	

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TRACTOR

For your convenience in writing to Caterpillar Tractor Co., you will find a card bound in this issue.

Shots From the Firing Line — *Continued*

Texas Notes

Road and bridge construction estimated to cost $10,000,000 is involved in projects, for which the Texas Highway Department will open bids in September and October. Tentatively scheduled for letting in these two months are 118 projects, with others to be announced as plans are completed.

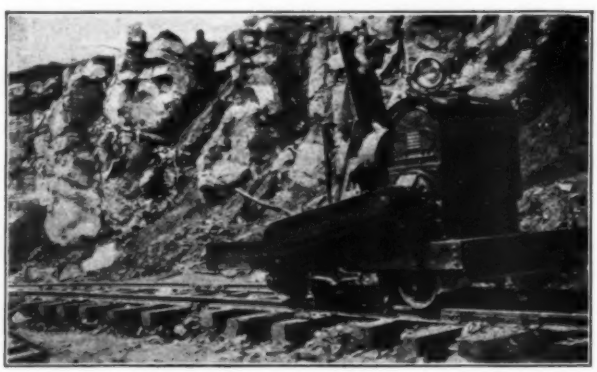
According to Gibb Gilchrist, State Highway Engineer, approximately $4,000,000 of the work will be awarded from the advance funds recently made available to the states by the Federal Government. One requirement of the act is that work on projects to which the advance is to be applied must be completed before July, 1933. The large total of projects to be awarded is accounted for because no contracts were awarded in August and the list really covers three months of normal lettings.

The program so far announced calls for more than 1200 miles of road construction and 9 bridge projects. Of the total, there would be 505 miles of grading and drainage construction and 702 miles of paving, several of the latter including reconstruction of grading and drainage structures.

A contract has been awarded to **W. H. Nichols & Company, Incorporated** of Dallas for the construction of a subway to carry the combined Lamar and McKinney streets under 12 tracks of the Chicago, Rock Island and Pacific; Missouri-Kansas-Texas; and St. Louis Southwestern railroads in that city, at a cost of $149,921. The cost of this project is being shared jointly by the three railroads and the city.

Rastus and Liza were roller skating when suddenly Liza fell, but flopped over and came up again with remarkable agility. "Did you all see how quick ah recovered mah equilibrium?" she asked.

"Ah sho did," he answered, "and almost before ah noticed it was uncovered."



Shifting Track in the Quarry

Whether it is in the quarry, or on the waste dump where the overburden is disposed of, this machine and a few laborers will do all the required shifting and raising of track.

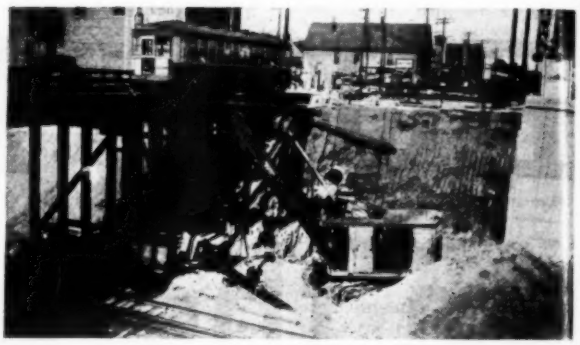
No large track gang need be maintained. Other operations need not be delayed waiting for track to be moved, or men taken from regular duties to work on track. Modernize your track raising and shifting operations with the Track Machine. It will save time and labor expense.

NORDBERG MFG. CO., Milwaukee, Wis.

THE NORDBERG PATENTED TRACK SHIFTER

Wisconsin Notes

By CARL J. BACHMANN



Richard E. Myers, prominent Milwaukee excavating contractor, used his Bucyrus-Erie Gas+Air shovel converted into a clamshell excavator as shown above digging for footings for a permanent bridge of concrete and steel which is to carry West North Avenue traffic over the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks subway. Street cars are using what is left of the temporary wooden bridge. This operation is part of the great separation program of the Northern Division of the Milwaukee Road in Milwaukee with the railroad, the City of Milwaukee, and the Milwaukee Electric Railway & Light Company sharing the work and expenses. The main excavation of the big 30-foot cut, 1¼ miles long, was handled by **H. W. Nelson and Chase & Gilbert Company** both of Chicago, with a 100-B steam shovel in 1929.

Colorado Notes

By H. M. BIBAUD

Contracts were awarded, August 3d, by the State Highway department, for five major Federal Aid projects totaling $295,773 thus assuring jobs for hundreds of men as announced by Chief Engineer, Charles Vail. The projects include paving between La Junta and Hadley and a bridge over the Wolf Creek Pass road besides three oiling projects.

According to highway officials, at least **one major highway construction job** will probably be included in the first group of jobs for which bids will be called as a result of the formation of the Finance Corporation and the releasing of funds for construction purposes in Colorado. Federal Aid Project No. 294 C for the completion of a highway between Mancos and Cortez is already surveyed and detailed plans are worked up. The appropriation for the job is estimated as $116,000. The project includes the reconstruction and surfacing of approximately seven miles of highway.

"Anchor"
"Anchor" Rerailers
Will retrack wheels from either or both sides of track at once
"Anchor" Puller-jack
The One-Man outfit for pulling, moving, lifting heavy loads
SAVES TIME & LABOR
NEW LOW PRICES
Complete Bulletin sent on request
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For quick, lasting track repairs
THEY PAY FOR THEMSELVES
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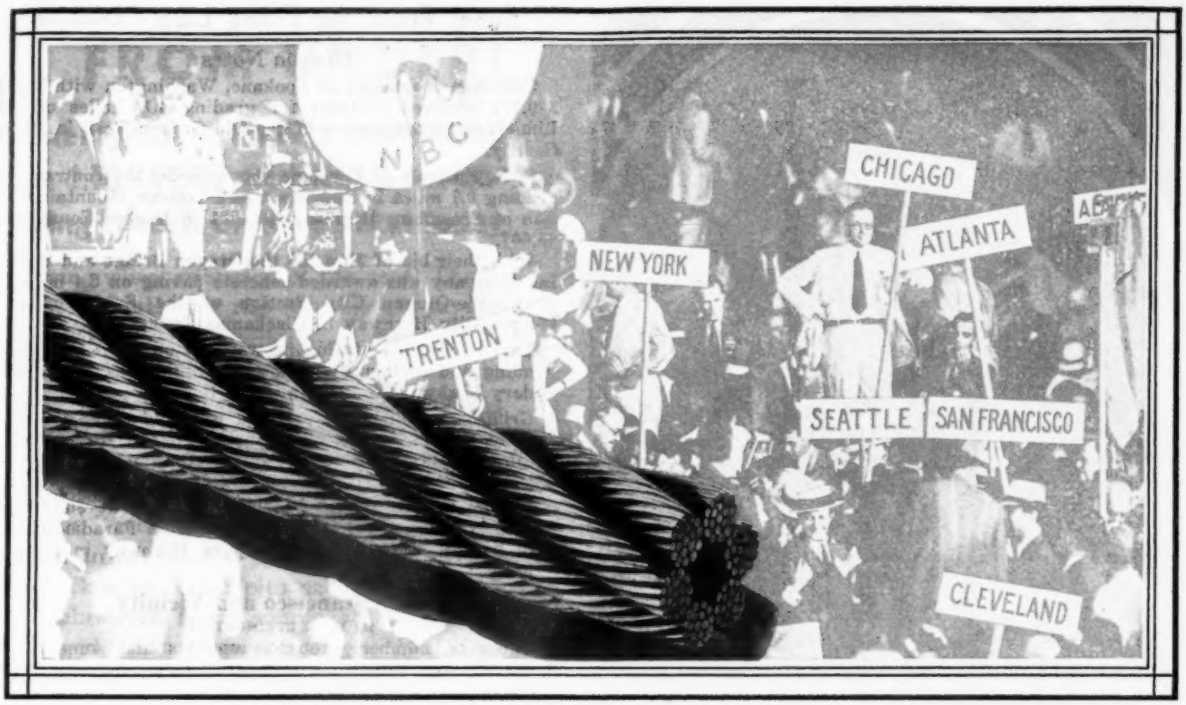

This PLATFORM
will appeal to any rope buyer

There are three planks in the Roebling Rope Platform—three simple, clean-cut statements of timely interest to every rope user.

1. Roebling believes that *safety* is the first requirement of practically every rope application. It is, therefore, the definite policy of this company to place safety to the forefront as an essential quality of Roebling Wire Rope and to make this rope unsurpassingly dependable.

2. Roebling advocates the purchase of rope on the basis of "lowest possible operating cost" consistent with this safety. It builds into its ropes the utmost of strength and stamina and confidently asserts that NO wire rope, regardless of make or construction, will show lower general-average operating cost.

3. It is Roebling's conviction that there is no wire rope cure-all—no one design of wire rope suitable for all purposes. Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. Therefore, it is able to recommend, without prejudice, *exactly* the rope needed for each individual use.

JOHN A. ROEBLING'S SONS CO., TRENTON, N.J.

Wire • Wire Rope • Copper and Insulated Wires and Cables
Welding Wire • Flat Wire • Wire Cloth and Wire Netting

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JOHN A. ROEBLING'S SONS COMPANY

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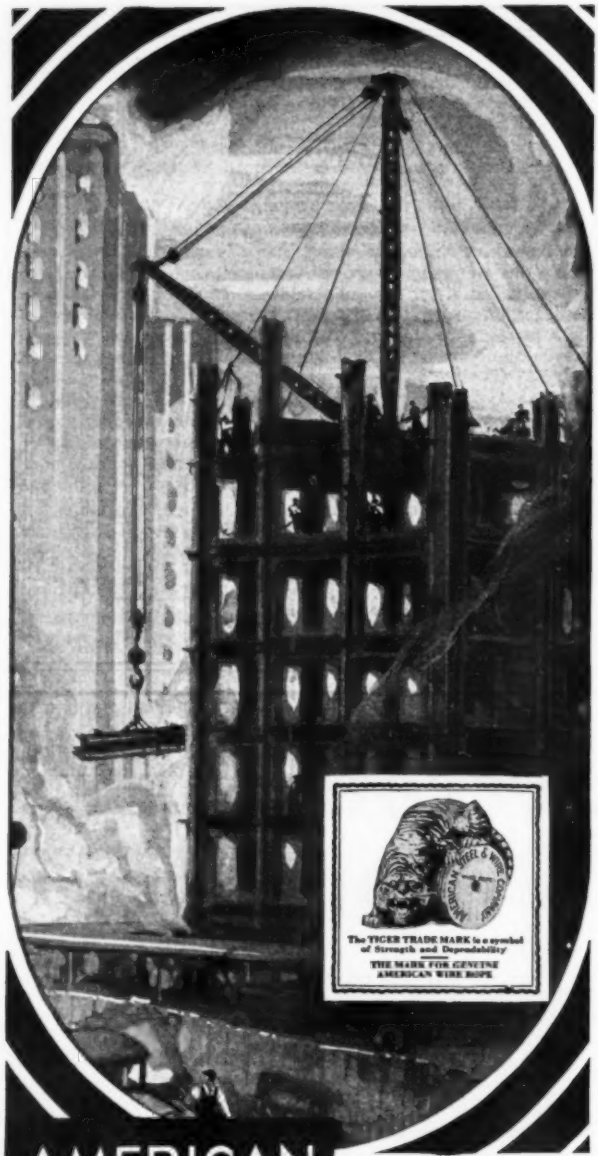

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Has made American Wire Rope the largest selling brand of Wire Rope in the World. Built into this product is the experience gained in many years of wire rope manufacture—in the successful application of wire rope to jobs of every size and description. Subjected to tests more severe than any encountered in practical service, American Wire Rope insures a safety and economy of operation that have gained acceptance for it in every field. Decide NOW to put American Wire Rope to the test. Prove to yourself that it is the answer to lower wire rope costs.

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208 South La Salle Street, Chicago — Empire State Bldg., New York
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AND ALL PRINCIPAL CITIES
Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco
Export Distributors: United States Steel Products Company, New York

Shots From the Firing Line — *Continued*

Oregon Notes

Clifton & Applegate of Spokane, Washington with bid of $89,771 received contract for grading 4.15 miles on the Lime-Huntington section of the Old Oregon Trail in Baker County.

C. U. Enstrom of Vernonia was awarded the contract for grading 0.7 miles in Bummer Creek-Lobster Mountain Section of Secondary Highway No. 201 in Benton County for $5,607.

With their bid of $114,156 the **Oregon Bridge and Dredging Company** was awarded concrete paving on 5.4 miles in Milwaukie-Oregon City Section of the East Portland-Oregon City Highway in Clackamas County.

Earl L. McNutt of Eugene was low on the 1.1 miles of grading and surfacing on the first Hughes Section of Secondary Highway No. 250, in Curry County.

Griffith & Hollenbeck of Bend with bid of $4,450 were low on the 4.55 miles of surfacing on the Horse Ridge-Millican Section of the Central Oregon Highway in Deschutes County.

Homer G. Johnson of Portland was low at $62,400 on the 12.41 miles of gravel surfacing on the Paradise Creek-Red Bridge Section of the Umpqua Highway in Douglas County.

San Francisco and Vicinity

By H. L. LIVINGSTON

The size, number, probable amounts and some of the items of the contracts that will be called for shortly for the **San Francisco Bay Bridge** are:

Substructure, West Bay Crossing ---------- $8,500,000.
269,242 cu. yd. caisson work
10,000 cu. yd. additional caisson work
50,000 cu yd. concrete seal
22,000 cu. yd. concrete foundation, Pier 2
24,000 cu. yd. concrete pier shifts and fenders
42,500 cu. yd. concrete superstructure, Pier 4
3,000,000 lb. reinforced steel, above foundation
140,000 lb. struc. steel, above foundation
1,000 M. ft. BM timber in fenders
85,000 lb. timber fastenings
4,200 lin. ft. creosoted piling

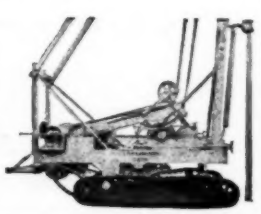
San Francisco Anchorage including
S. F. approach ---------- $1,500,000.
16,000 cu. yd. concrete below elv. 6.0 including exc. and cofferdam
43,000 cu. yd. mass concrete above elv. 6.0
3,000 cu. yd. reinforced concrete
1,530,000 lb. reinforcing steel
2,570,000 lb. anchorage steel

Drains, stairs, etc.
(Structure to Rincon Hill)
7,080 cu. yd. concrete
850,000 lb. reinforcing steel
60,000 lb. structural steel
540 cu. yd. ballast

Blast Hole Drilling and Loomis "Clippers" Grew up Together

The history of Loomis "Clippers" tells the story of the drilling industry. Long before drills were used for drilling blast holes, Loomis "Clippers" were on the job putting down wells, quarry sink holes, ventilation shafts for mines, etc.

Since the introduction of high explosives in the mining and quarrying industries, Loomis "Clippers" have kept pace with the rigid demands of these industries for dependable low-cost drills. There is a reason they predominate.



The Loomis Machine Co.
K Street Tiffin, Ohio

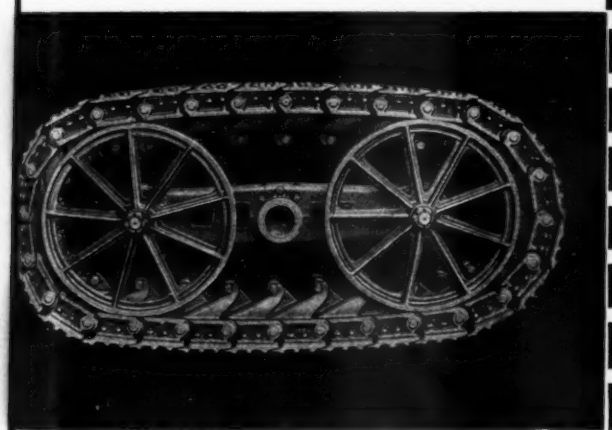
GET OUT FROM UNDER!

—Lower your operating costs with the LIGHTEST RUNNING Track-laying Wheels on the market today

e tracklaying wheel sensation of the year! That's at contractors all over the country are saying out the new Forged-Traks—finest, fastest, sturdi- wheels ever put on the market.

Amazingly *light running*, the new Forged-Traks eed up every job they tackle, highballing along in gh to set new records for time-saving and power- ing. Drop-forged track links mean extra life and tra strength. Tracks are absolutely rigid to elimi- te motion under load—one of the principal uses of track wear. Track pins are sealed against trance of abrasives. Every simple, sturdy part of e new Forged-Traks gives you bigger VALUE at OWER COST.

Send for Bulletin No. 510, describing the new rged-Trak Wheels in detail. Find out for yourself y the demand for Forged-Traks is growing by ps and bounds!



The FORGED-TRAK Wheel With Drop-Forged Track Links

Track Pin Bearings Sealed Against Entrance Of Abrasives

Track Structure Eliminates Motion Under Load

Life-long Arch—Extremely Light Running

Improved Type Heavy Duty Rocker Beam

Completely Self-Cleaning Track

Every Proved Mechanical Feature

NEW LOW PRICES

PER PAIR

10-TON	. . .	$ 845.00
15-TON	. . .	1045.00
20-TON	. . .	1295.00

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ATHEY TRUSS WHEEL CO., CHICAGO, ILLINOIS

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Forged-Trak

REG. TRADE MARK

Shots From the Firing Line— *Continued*

45 M. ft. BM timber
150,000 lb. rails and fastenings
Substructure, Piers 2 to 5, East Bay Crossings..$2,000,000.
9,000 cu. yd. concrete foundation, Pier E-2
3,600 cu. yd. concrete above elv. O.O, Pier E-2
57,814 cu. yd. caisson work. Piers E 3, 4, 5
4,700 cu. yd. addition, caisson work, E 3, 4, 5
17,000 cu. yd. concrete seal, Piers 3, 4, 5
7,500 cu. yd. concrete above elev. O.O, E 3, 4, 5
532,000 lb. reinf. steel above elev. O.O, E 2-5
Substructure, Piers 6 to 22, East Bay Crossing..$2,000,000
391,600 lin. ft. timber piles, Piers E 6-22
22,000 tons gravel blankets, Piers E 6-22
61,200 cu. yd. concrete seal
39,700 cu. yd. concrete shafts
1,500,000 lb. reinforcing steel
350,000 lb. anchorage steel work
Yerba Buena Tunnel, anchorage and concrete work ..... $2,500,000.
Fill construction north of Key Route mole..... $1,000,000.
Superstructure, West Bay Crossing, except cables $11,000,000
(Trusses)
35,300,000 lb. silicon steel
2,000,000 lb. carbon steel
(Floor system)
27,000,000 lb. silicon steel
9,170,000 lb. carbon steel
(Bracing)
2,360,000 lb. silicon steel
1,400,000 lb. carbon steel
(Towers)
34,000,000 lb. silicon steel
10,800,000 lb. carbon steel
600,000 lb. cast steel
(Bents)
1,620,000 lb. carbon steel
150,000 lb. cast steel
(Anchorage steel—Pier 4)
450,000 lb. heat treated eye bars
620,000 lb. carbon steel eye bars
1,910,000 lb. silicon steel
(Upper deck)
12,600,000 lb. steel
4,600 cu. yd. concrete
(Lower deck)
6,300 cu. yd. concrete
620,000 lin. ft. reinforcing trusses
500,000 lb. reinforcing bars
1,300 M. ft. BM timber
3,170,000 lb. rails and fastenings
Cables and attachments ..... $6,500,000.
35,820,000 lb. cable wire
226,000 lin. ft. suspension ropes
2,100,000 lb. cast steel
44,000 lin. ft. hand rope
250,000 lb. high tensile bolts
30,000 lb. cast iron
650,000 lb. wrapping wire
Superstructure, East Bay Crossing, except approaches ..... $8,000,000.
(Trusses)
6,860,000 lb. heat treated eye bars
6,290,000 lb. nickel steel
21,100,000 lb. silicon steel
14,410,000 lb. carbon steel
(Floor system)
20,850,000 lb. silicon steel
13,110,000 lb. carbon steel
(Bracing)
780,000 lb. silicon steel
6,300,000 lb. carbon steel
(Bents-shafts)
7,600,000 lb. silicon steel
2,000,000 lb. carbon steel
(Bents-bracing)

UNIFORM EXCELLENCE OF QUALITY
PLUS
SUITABILITY FOR THE WORK REQUIRED

YOU'LL find these vital characteristics in the next wire rope you use, if you order it from Bucyrus-Erie Company. Let us safeguard the life of those parts of your machine which might be damaged by the use of an improper rope. . . let us add to the life of the rope itself by assuring you of uniform quality and proper selection.

You will profit by the engineering study we have made of your wire rope problems.

Write for Bulletin S-31

BUCYRUS ERIE

Builders of excavating machinery since 1880.

BUCYRUS-ERIE COMPANY Specialty Dept. SOUTH MILWAUKEE, WIS.

4 vital reasons
why you should use BECOBLOCKS

1 BECOBLOCKS will save frequent and unnecessary replacements.

2 BECOBLOCKS will outlast several sets of wood blocks.

3 BECOBLOCKS are of uniform quality throughout and wear evenly all through their long life.

4 BECOBLOCKS will operate smoothly and effectively even on continuous day and night operation.

Write for complete information — no obligation.

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

One of four LINNS owned by Plymouth Excavating Co., Plymouth, Pa. Progressive stripping contractors have found that LINN'S power, speed and utility saves real money in removing overburden as well as in moving coal.

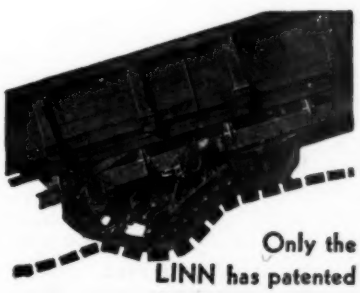
COAL STRIPPING . . .

another job where LINNS show their earning power!

Built to specification for coal stripping . . . that's the reason why LINNS have brought hauling costs to a new low level throughout the anthracite fields. Both in moving overburden and in hauling coal to the loading chute, LINNS make more trips per day, and haul more yardage per trip. LINN'S patented flexible traction masters weather, grades and toughest terrain. Operations never need be tied up. And LINN'S costs of operation and upkeep are low . . . far lower than those of other haulage equipment. Before you buy haulage equipment, visit a LINN stripping operation. Learn why progressive contractors are banking on LINNS. Complete details on request.

LINN TRACTORS

"LINN PRODUCTS ARE PATENTED"



Only the LINN has patented *flexible* traction

LINN MANUFACTURING CORPORATION

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Roanoke, Virginia	Youngstown, Ohio	Baltimore, Md.	Denver, Col.
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Skowhegan, Maine	Louisville, Ky.	Little Rock, Ark.	Portland, Ore.
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BULL-DOG

WEDGE ROPE SOCKETS,

easily attached in the field by unskilled labor, will develop practically the same strength as ordinary sockets which require considerable care and skill to zinc or lead-in. They will not damage the rope.

Bull-Dog Wedge Rope Sockets have been designed so that the rope pull is in line with the point of attachment. They *never* let go.

Made in more than a dozen sizes—for wire ropes from ½-in. to 2 in. in diameter.

Four different styles: Open, Closed, Bridge and Double.

Write for complete information and prices.

Specialty Department.

BUCYRUS-ERIE CO.
South Milwaukee, Wis.

BUCYRUS ERIE

PARTNER. For the excavator who wants to cut down digging and handling costs, a Hayward Bucket is sure to prove itself a useful partner. Address The Hayward Company, 52-54 Church Street, New York, N.Y.
Hayward Buckets

Shots From the Firing Line — *Continued*

4,000,000 lb. carbon steel
(Upper deck)
11,200,000 lb. steel
4,050 cu. yd. concrete
(Lower deck)
5,650 cu. yd. concrete
556,000 lin. ft. reinforcing trusses (2,200,000 lb.)
500,000 lb. reinforcing steel
1,200 M. ft. BM timber ties, etc.
2,700,000 lb. rails and fastenings

Mittry Brothers Construction Company of Los Angeles was the lowest of twenty bidders for 5.9 miles of grading between Inspiration Point and Scott Valley in Santa Cruz County. Their bid amounted to $280,181.00. The principal item in this contract was 1,227,000 cubic yards of excavation.

Estimates amounting to $9,051,790.00 were filed by the Chief Engineer of the Los Angeles Flood Control District and a formal application for a federal loan from the Reconstruction Finance Corporation will be made by the County Board of Supervisors of Los Angeles County for the construction of the **Ballona Creek and Compton Creek Flood Control projects.** It is estimated that the Ballona Creek project which is to relieve area in the vicinity of Culver City will cost $6,311,630. The Compton Creek project, which is to carry flood waters from 108th and Main Streets in Los Angeles to the Los Angeles river below Compton, is estimated to cost $2,740,160.

Thompson Bros. of Fresno, who bid $299,789.00 were low bidders to the California Division of Highways for 8.4 miles of grading and surfacing between Lemon Cove and Three Rivers in Tulare County. This job contains 209,000 cubic yards of roadway excavation.

The Riverside-Southwestern Portland Cement Company and the Portland and Monolith Cement Company were awarded the contract for furnishing 471,000 barrels of cement by the City of Pasadena for the **Pine Canyon Dam.**

Granfield, Farrar & Carlin are rapidly pushing their Cloverdale job through to completion. In five months of double-shift work, with four shovels, they have moved one million yards of material. This leaves 800,000 yards yet to be moved and unless an extremely wet winter sets in they hope to complete their job by February 1st, 1933.

Hemstreet & Bell of Marysville have been officially awarded a contract by the bureau of Public Roads for 28.077 miles of placing crushed rock on the National Forest Highway in Modoc County. This contract was in the amount of $109,827.

Los Angeles and Vicinity

By D. BANKER

Hanawalt Brothers, San Bernardino and Ramona avenues, Pomona, started excavating the last of August for foundations for the new $150,000 Claremont high school. Part of the building is to be ready for occupancy about October. George F. Bartlett, 2132 Chestnut street, Long Beach, is general contractor for the building.

Teacher, to banker's boy (the brightest in the class): "How many bones have you in your body?"
Willie: "Nine hundred."
Teacher: "That's a good many more than I have."
Willie: "Yeah, but I had sardines for lunch."

MEETING PLACE OF CAPITAL AND LABOR

THE KOENIG LABOR AGENCIES

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SUPPLY DELIVERY★
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Loadmaster is a time and trouble saver on excavating or construction jobs. It gives you everyday handy service . . . lifts, swings or carries loads up to 4500 pounds. In addition it hauls trailers and portable construction equipment. Use center card to ask for the Loadmaster bulletin.

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Unloads, loads, carries or hauls: drums (oil, grease, gasoline), wire rope, dipper teeth, electric cable, repair parts, ties, rails, track materials, mats, timber, forms, steel, pipe, pumps, logs, stumps, boulders. Bulldozer, winch, clamshell or compressor available at slight extra cost.

★

BUCYRUS ERIE

LOADMASTER

BUCYRUS-ERIE COMPANY, SOUTH MILWAUKEE, WIS.

Putting through the Fort Worth and Denver Northern, Childress to Pampa, Texas

(Continued from page 479)

165,000 yards of excavation with 40,000 yards of side borrow. Material included sandstone, sand and common. The average cut was 8 feet, the maximum 32 feet. Grading was handled by a 1-yard Thew 55 with dump wagons and Ford trucks and handled the borrow with teams. Mr. Skousen was on the job in person assisted by Foreman Richard Bentley. The work was completed between September 24th, 1931 and April 1st, 1932, the shovel working 150 shifts. Mr. Skousen's camps were located at Mile 261½, Mile 258 and Mile 256.

On Kadane Construction Company's section which parallels the north fork of the Red River, the Fords were kept humping in the "sugar" sand by the 32-B.

Hamilton & Gleason Dig Million Yards in Seven Months

Hamilton & Gleason Company handled the 21 miles starting from Mile 264 on the north side of the Salt Fork to Mile 285 direct. Excavation totaled approximately a million yards and consisted of mixed earth and rock. Excavating equipment included a Bucyrus-Erie 50-B steamer which loaded to 5-yard Coleman trucks. Two Lorain 75's loading to 1½-yard trucks and a 15-team outfit. The heaviest cut was 55 feet in depth, the average about 20 feet. The work was started September 1st, 1931, completed May 1st, 1932. Three camps were operated, being located at various times during construction at Mile 263, 266, 270, 274, 278, 281 and 284. C. B. Berry was in charge of the Hamilton & Gleason section.

C. M. Green Has 240,000 Yard Section

The next four miles from 285 to 289 were handled by C. M. Green in person. Mr. Green also had two sections mentioned previously in connection with B. G. Brown under the firm name of Green and Brown. Mr. Green's four mile section carried 240,000 cubic yards and was handled with Lima 101 and trucks. This section was started December 15th, 1931 and finished May 15, 1932.

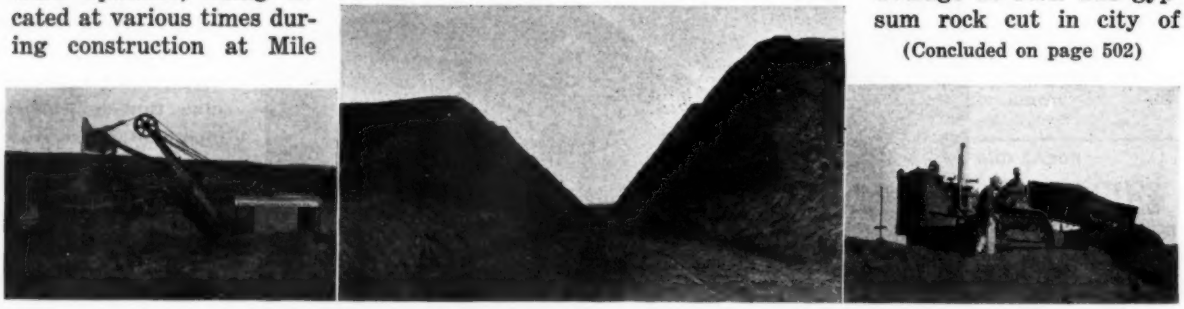
Kadane Construction Company Encounters Tough Problems

Kadane Construction Company had an interesting section in their 15 miles between 289 and 304 which contained 390,000 cubic yards of loose sand and, in a special cut in the city of Shamrock, 100,000 cubic yards of heavy gypsum rock. The 15-mile section of the line almost parallels the north fork of the Red River and much of it is built over ground that is mostly "sugar" sand. So continually is this sand blown about by the wind that Kadane Construction Company had to haul clay from the few places where this material was found in their section to make a 1-foot blanket to keep their fills in place. The sand embankments were carried one foot below grade to carry the clay. This made double work all through the sand sections.

Another difficulty in this sand was to keep the hauling equipment on top and moving. After numerous experiments it was found that use of a relatively heavy grade of wire screening such as is used for the washing screens in gravel plants, made a most successful mat to lay on top of the fills so trucks could back out and dump. They also found that small Ford trucks with dual wheels, while not quite ideal, were the most successful for the hauling.

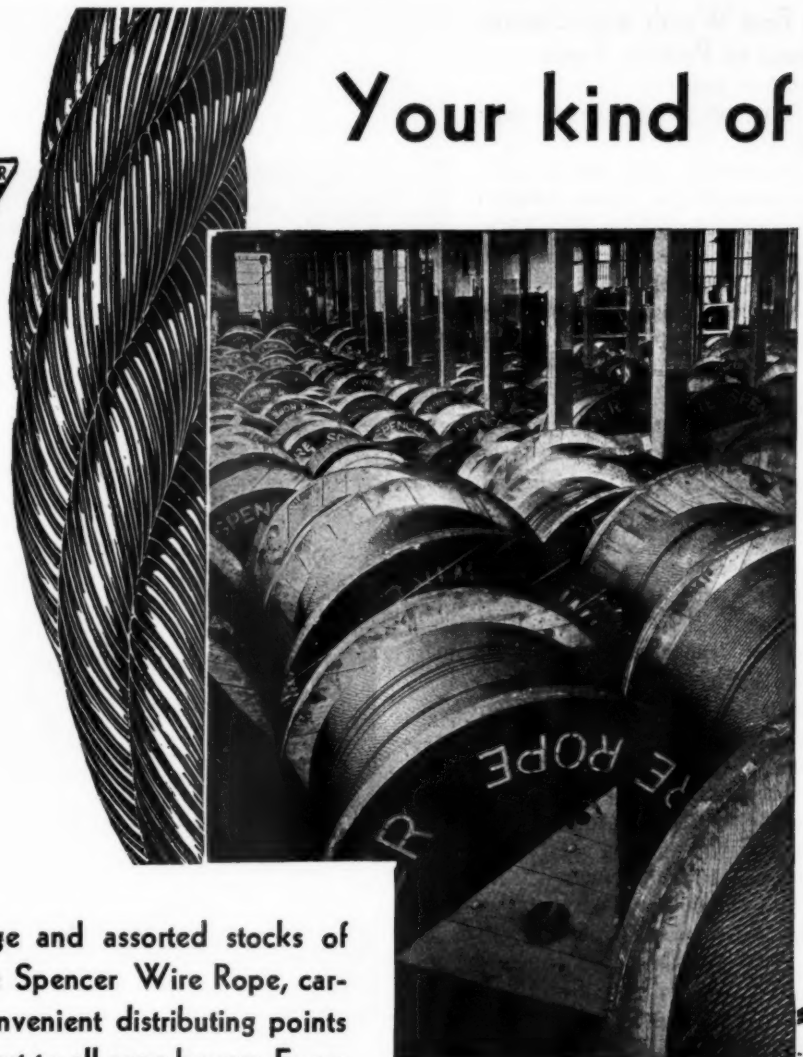
Two Bucyrus-Erie 32-B 1-yard gasoline shovels and an elevating grader were used for loading. Thirty Ford trucks with 1½-yard hydraulic-lift bodies did the hauling and two Caterpillar tractors made themselves generally useful in handling the grader, finishing, etc. Maximum cut was 32 feet, average 16 feet. The gypsum rock cut in city of

(Concluded on page 502)



The center view shows one of the finished cuts along Roberts Brothers' section. Note the variations in material encountered in the bank; also the excellent finishing. At the left is one of their Lorain 75's in action, and at the right one of the Caterpillar-drawn Athey 3-way dump trailers on one of the fills.

Your kind of ROPE



THE large and assorted stocks of Wickwire Spencer Wire Rope, carried at convenient distributing points is of interest to all rope buyers. Every size and type is the highest quality of its respective kind. The builder of equipment requiring rope as well as the user of that equipment can always obtain HIS KIND OF ROPE on short notice.

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Send for our book. It is free and will prove of great value.

WIRE ROPE *by Wickwire Spencer*

For your convenience in writing to Wickwire Spencer Steel Company you will find a card bound in this issue.

Putting through the Fort Worth and Denver Northern, Childress to Pampa, Texas

(Concluded from page 500)

Shamrock involving 100,000 cubic yards was handled with the 32-B.

Work was started October 15, 1931 and in spite of the difficulties encountered the entire 490,000 yards had been moved and finished by May 15th, 1932. G. E. Kadane was in charge and maintained camps at Magic City and Shamrock.

Roberts Bros. Move 810,000 Yards in 6½ Months

Roberts Bros. handled the 810,000 yards of sand, clay and caliche (approximately 40% caliche) between 313 and 327. This 14 mile stretch averaged 58,000 yards per mile and approximately 80 per cent of the material was in grade cuts with the balance in borrow. Average cut was 18 feet with the maximum at 45 feet.

Work was started on September 1st, 1931 and completed April 13th, 1932, and was under the supervision of G. W. Roberts with James Stanley as Superintendent. Equipment included two Lorain 75-B's, one with 1¼-yard dipper, the other with a 1½; eight Caterpillar Sixties, eight Athey Truss Wheel 3-way dump trailer wagons. The haul ran from 300 to 5500 feet, averaging 1300 feet.

Camps were mounted on wheels and moved along the line as the work progressed being usually located between the shovels so that the distance between camp and operations was always very short.

John S. McKnight—100,000 Yards

John S. McKnight had 100,000 yards of excavation and borrow in his five miles, 327 to 331 inclusive. Material was earth and clay, and the cuts were very light, averaging about five feet and with the maximum at six. Mr. McKnight used a Stroud elevating grader (senior size), dump wagons and trucks, with 80 head of mules on the job. While the cuts were comparatively light there was one fill containing 40,000 yards and with a maximum height of 65 feet. The work included the yards near Pampa and there was a single cut with 38,000 yards from which the material for the yard was handled.

Here is the Red River Fill at Mile 232. One of Barker Bros. Internationals is putting away its load.

Above: The special rock cut handled by Kadane Construction Company was made to bring the grade of the Denver Northern exactly to that of the Rock Island where they intersected in the city of Shamrock. Below: note the long reach of the 32-B. By loading to the trucks on the bank bigger outputs were maintained.

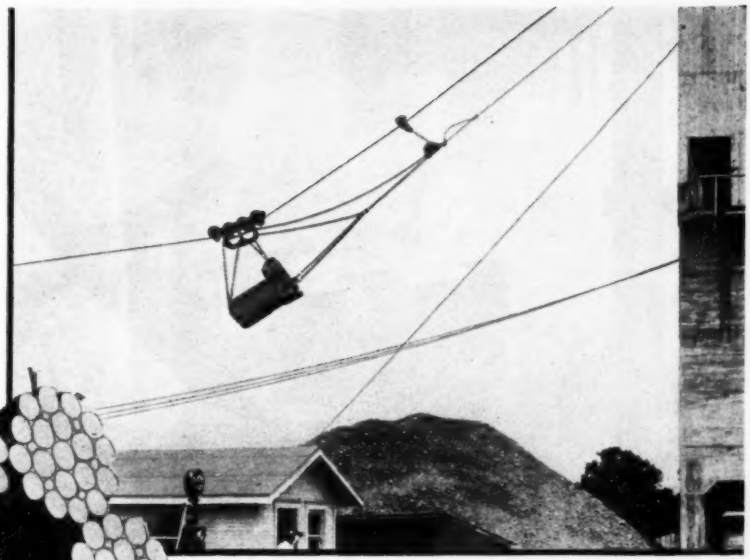
The work started in November, was finished May 31st, 1932 and was supervised by Mr. McKnight in person. Camps were maintained near Pampa.

Bridge Work by Peppard & Fulton

All of the bridge work except as mentioned, was done by Peppard & Fulton. Superintendent B. W. Mickey was in charge for this contractor.

The engineering work for the F. W. & D. N. was handled out of the office of Chief Engineer R. C. Gowdy at Denver, with A. P. Briggs in immediate charge as Construction Engineer with headquarters at Childress. There were also eleven resident engineers along the line with headquarters about every ten miles.

For the general contractors all work was under the supervision of Secretary Charles Berry of Hamilton and Gleason and G. W. Roberts of Roberts Bros. General Superintendent Berry maintained his field head office at Childress, with another office at the Mission Hotel at Shamrock. Mr. Berry and his associates deserve great credit for the excellent way the job was organized and pushed through. The 120 miles of heavy construction was completed in nine months—railroad men of the southwest claiming that this is the fastest railroad construction ever completed.



. . . . it must be good rope in a gravel plant

There is nothing gypsy about a modern gravel plant. It is permanently located and operates with the same equipment day in and day out. Every unit is subjected to the dollar-per-yard check. The fact that Wickwire Spencer Wire Rope is in so general use in sand and gravel plants is proof of its merit for all engineering equipment. . . . . .

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WIRE ROPE *by Wickwire Spencer*

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Top: Looking west along Kingsbridge Road where a Bucyrus-Erie 41-B is digging out the rock to lower the underpass. The center-supported bridge running north and south in the background carries the Grand Concourse and the new subway was run through the north and south abutment walls under the Grand Concourse and over Kingsbridge Road. Bottom: A battery of rock-drills preparing holes for shots before starting cut.